

Public Utilities

Volume 59 No. 7



March 28, 1957

COMPENSATING FOR SHORTAGES OF UTILITY ENGINEERS

By Alfred M. Cooper

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An Expanding Kilowatt Economy

By Edward A. Fontaine

« »

Results of Low-cost Federal Financing of Hydro Projects

By John Bauer

« »

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Public Utilities

FORTNIGHTLY

VOLUME 59

MARCH 28, 1957

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This author concludes that maintenance of a stable economy must be accepted as an outright federal responsibility.

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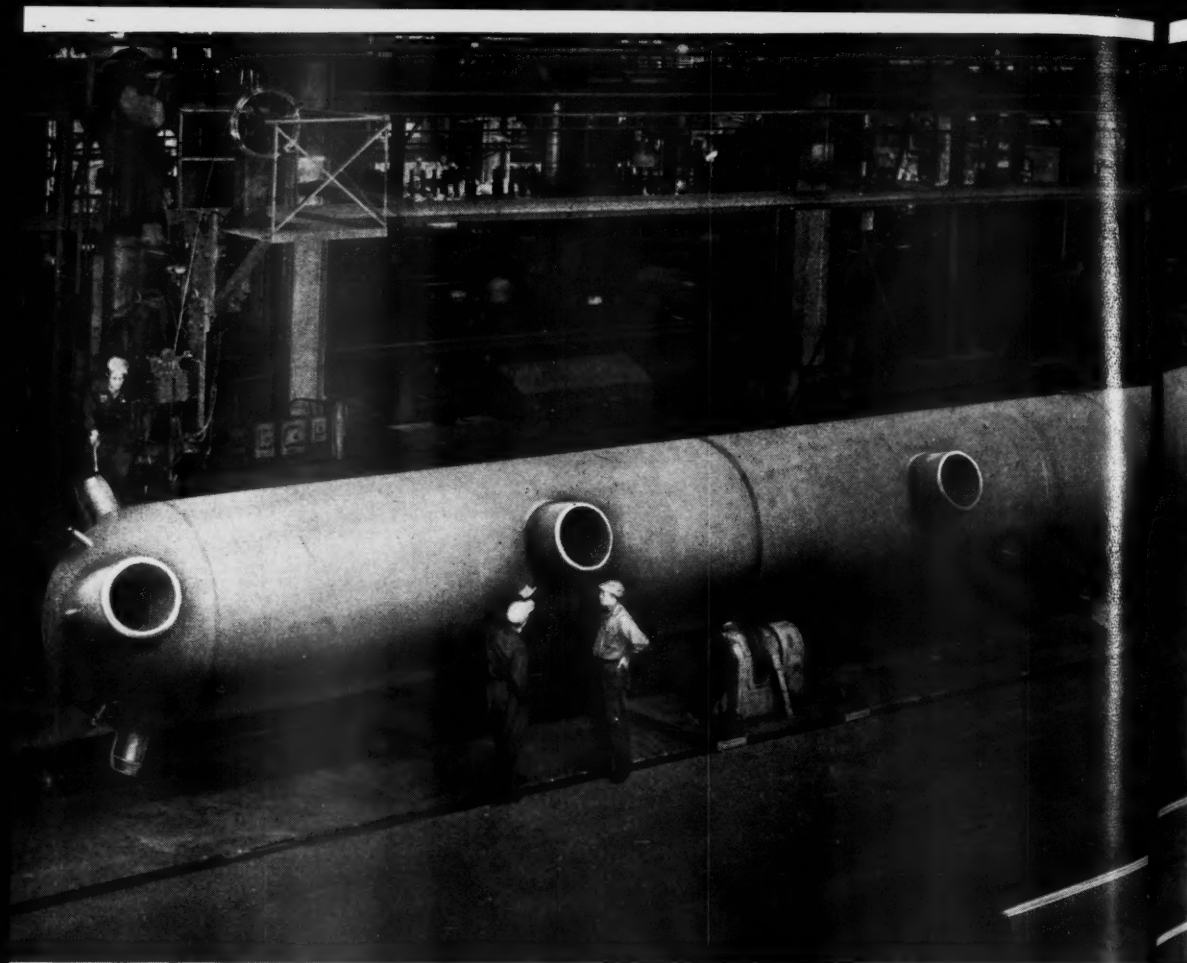
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CONSTRUCTION IN HIGH

Two of the world's largest boilers for

Keeping ahead of the world's greatest city is no easy task—but for many years “largests” and “firsts” have had to be the rule with New York's source of light and energy.

B&W furnished the first million pound per hour boiler for Con Edison's Hell Gate Station back in 1930. Many other engineering advances later accepted as standard in the industry have been pioneered on this system. For example, B&W furnished—for Con Edison's Astoria Station—the first pulverized-coal-fired pressurized boilers operating without induced draft fans.

And now, this latest step: two huge B&W Radiant

Boilers being built for Con Edison . . . right in line with Con Edison's long-standing policy of progressive engineering.

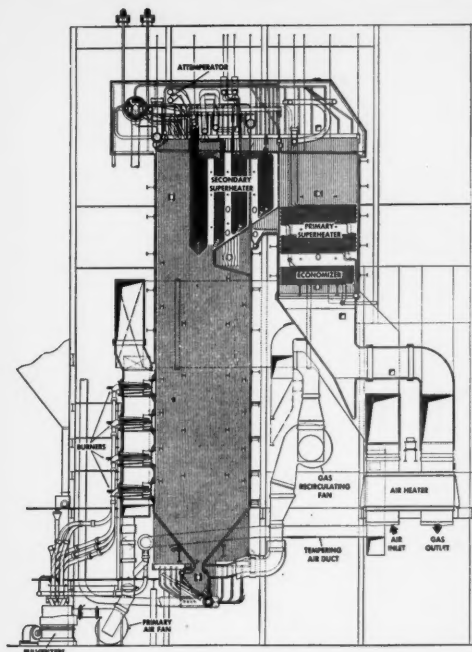
Each B&W Radiant Boiler has a capacity of 2,400,000 lb of steam per hr and features pressure-firing, natural circulation, and separate furnaces with a single steam drum. The unit for Astoria is the third pressure-fired B&W Boiler to be designed for this new modern station of the Con Edison System.

In all but size and design details, Con Edison's new boilers are typical of many other B&W units now providing dependable, efficient steam generation in central station and industrial plant service.

PHOTO COURTESY OF B&W



The world's largest boiler drum . . . over 100 feet long, 66 inches inside diameter . . . is shown in a finishing bay at the B&W Barberton Plant awaiting shipment to Con Edison. It weighs over 200 tons.



One of the two identical B&W units for Con Edison's Astoria and Arthur Kill Stations. It is a horizontally pressure-fired, coal-burning Radiant Boiler designed for dry ash removal. Type EL Pulverizers are used to permit reliable, efficient, direct-firing of pulverized coal. The unit has a design pressure of 2500 psi, steam temperature of 1050 F and reheat to 1000 F. The secondary superheater is located at the exit of one furnace, and the reheater at the exit of the other furnace. The primary superheater is back of both the secondary superheater and the reheater. The giant drum, with Cyclone Steam Separators for natural circulation, provides nearly 100% separation of steam from water.

H GEAR AT CON EDISON

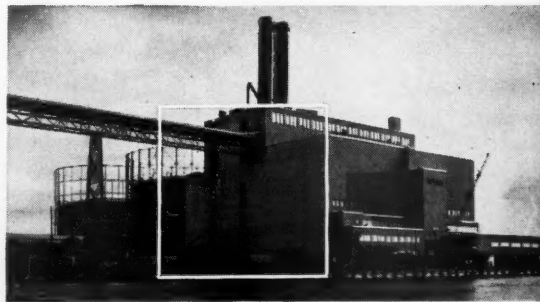
for Astoria and Arthur Kill Stations

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BOILER
DIVISION



Area outlined in white shows construction area on third unit for Con Edison's Astoria Station.

Pages with the Editors

THE general shortage of trained engineers for all industry, as well as for government services, has placed fresh emphasis on the problem of occupational specialization. The government services in particular, because of their limited budgets and modest salary scales, have had to experiment with a number of techniques for spreading the available engineer supply around as far as possible.

WHAT these ideas boil down to is the substitution of cadet engineers or nonprofessional technicians where they can be used to replace the professional engineer. Even the training of nontechnical people for special jobs or particular operations is considered as a means for releasing the engineer from unnecessary demands on his time. It has not been easy. And it won't be any easier in the future, judging by the constantly growing requirements for engineering services due to the introduction of new and complicated operations.

YET, there is a hazard to our cultural life as a whole if we yield to the temptation of trying to grow too big, too exclusive a crop of engineering and technical people, too quickly at the educational level. Scientists and business executives alike have recognized the overriding impor-



ALFRED M. COOPER

tance of maintaining a balanced judgment in our trained professional people. They have seen the dangers of such concentration on a particular form of training which results in—as the old vaudeville comedian used to say—“learning more and more about less and less until he knows everything about practically nothing.” Aristotle’s ideal of universal knowledge and the essential integrity of the “whole man” must not be sacrificed too ruthlessly for any temporary “crash” program which would turn our technical schools into hothouses for hatching out uninformed neurotics, however competent, as specialized technicians.

EVEN Russian Soviet educators, with their single-track emphasis on scientific and technical specialization, have come to realize that an uninformed virtuoso of the slide rule or the test tube can become more of a liability than the dullest peasant on a co-operative farm. The counterbalance, to protect our future engineers themselves against all-around educational malnutrition, is to make the best use we can of those sound and well-balanced engineering professionals now in practice.

THIS involves not only placing them in positions which will utilize their capacities but in enlisting them for work where they



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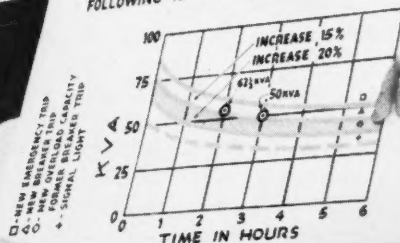
in all new Westinghouse distribution transformers *without sacrifice of service life!* The evidence is several thousand Westinghouse transformers with increased breaker settings put on Union Electric's lines, many since 1954, without a single burnout.

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LOAD TIME CURVES
WESTINGHOUSE 25KVA CSP TRANSFORMER
FOLLOWING 75% LOAD, 35°C AMBIENT



W. R. McMillan, Supt. Distribution, Union Electric Co., one of three utilities who joined Westinghouse for this major development, with Cooper Slay, St. Louis Westinghouse representative. "Higher Westinghouse transformer breaker settings have meant a decided decrease in breaker trip-outs with no loss of transformer

Westinghouse

25

PAGES WITH THE EDITORS (Continued)

want to be. The administrative problem, therefore, would seem to be explaining the various forms of industry to the engineer before he signs up so that he will go where he feels he can realize his greatest potential.

It is well known that public utility industries are finding the shortage of trained engineers just as embarrassing and difficult as many other industries that fill the daily newspapers with their advertisements to attract such professional specialists. And certainly the manufacturers of utility equipment and appliances feel the effect of engineer shortage. In the leading article in this issue, ALFRED M. COOPER of Indio, California, who has written several books on employee relations and personnel matters in the utility industry, has some suggestions of value for management people who are confronted with the problem of filling the gap caused by the shortage of trained engineers.

* * * *

THE picture drawn by EDWARD A. FONTAINE (in his article beginning on page 439) on the expanding status of the electric utility industry in our American economy is one which will be of interest not only to the electric utility people but those engaged in other public utility work, as well as the regulators. MR. FONTAINE, who is manager of the electric department of Stone & Webster Service Corporation, has introduced some growth pattern charts which may even startle readers of this specialized publication. To some it might appear exaggerated, but anyone in a mood to bet where the line of electric utility capacity will be in the year 2000 or the year 2100 would do well to fortify himself by reading MR. FONTAINE'S carefully marshaled statistics and his objective construction of the same.

MR. FONTAINE is a graduate of Brown University (BS, '38, in electrical engineering). He first joined the Stone & Webster organization as a junior engineer following his graduation. He served with the U. S. armed forces in World War II



JOHN BAUER

as a Captain in the Signal Corps, then joining the Sierra Pacific Power Company in 1946, becoming power engineer in 1947. He returned to Stone & Webster in 1949 as a rate engineer and is now manager of the electric department of that organization.

* * * *

DR. JOHN BAUER, whose article on the "Results of Low-cost Federal Financing of Hydro Projects" begins on page 449, will be well known to many of our readers because of his long-time leadership of the American Public Utilities Bureau, which has recently been merged with the Public Administration Service of Chicago. DR. BAUER, who now has his office in Chatham, New Jersey, continues as consultant for that group. He was educated at Doane College (BA, '04; LLD, '35) and Yale (BA, '06; PhD, '08). He has lectured at Cornell, Princeton, and Columbia and has written a number of books, as well as a multitude of articles, on public utility regulation and organization. His professional services, which began as a statistician with the New York commission back in 1914, have extended to a great number of clients in utility rate cases, including over thirty large cities of the United States.

THE next number of this magazine will be out April 11th.

The Editors

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(April 11, 1957, issue)



FAIR VALUE REVISITED

No matter what the U. S. Supreme Court says, nor how much the regulators may desire it, there is no simple, precise formula to secure an equitable "end result" in fixing utility rates. Through the process of commission-made law and judge-made law, dominated by shifting climates of public opinion, the so-called "fair value rule" of rate making has been receding in influence. But with the emergence of inflationary pressures practical considerations may now demand that regulators take a fresh look at the "fair value rule." We have such a re-examination in this article, under the challenging title "Fair Value Revisited," by Charles K. Robinson. He is a well-known public utility attorney of Pittsburgh, whose background includes many years of rate case practice on behalf of the public as well as public utility companies. He concludes that there is a basic and erroneous assumption which lies in the use of a system of strict accounting for the rate-fixing process which rests upon an unrealistic and false premise of a constant, unchangeable dollar.

THE ALUMINUM INDUSTRY TURNS TO COAL

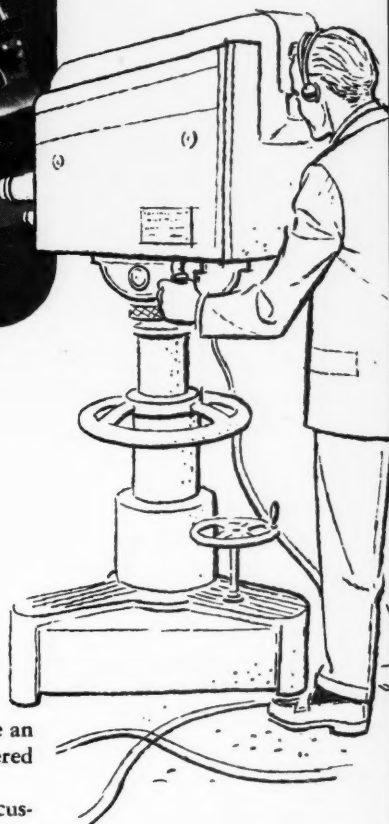
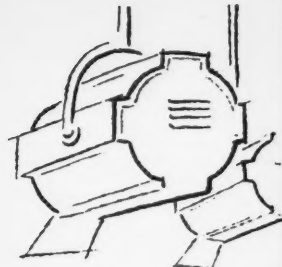
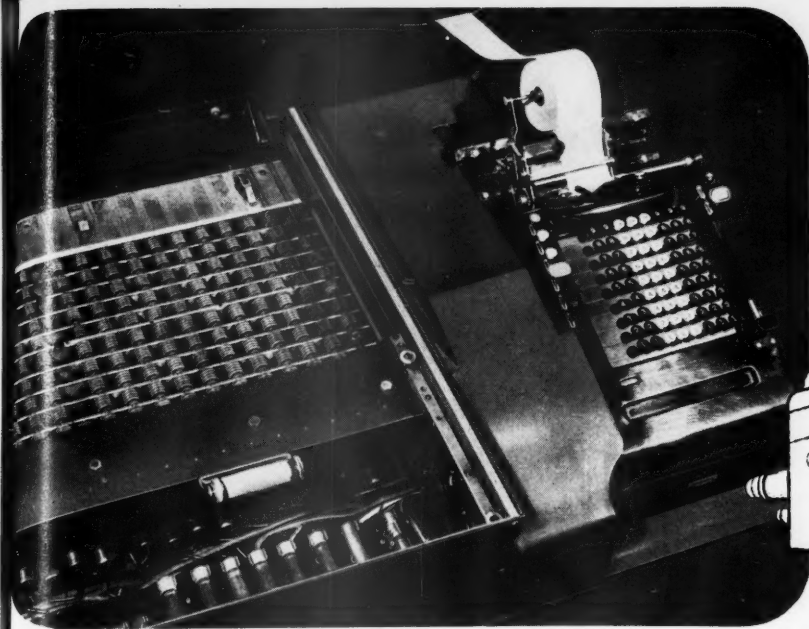
For many years the aluminum industry sought out favorable hydroelectric sites as the choice location for its aluminum reduction plants. Recently, however, this industry is plotting the location of underground "fossil" fuel reserves and planning the construction of its new reduction facilities adjacent thereto. Depending upon regional geology the fuel might be natural gas, lignite, or bituminous coal. Often the area's public utility company co-operates by constructing the power plant. This trend in mine-mouth aluminum plants is ably described by Henry G. Schmidt, president of the North American Coal Corporation.

SHARPENING THE UTILITY NOSE FOR NEWS

Scarcely a day goes by in the operation of any public utility company which does not produce some event or development which might be called "newsworthy" by an experienced journalist. These things happen among utility employees who are invariably conscientious people, hard-working at their jobs, and understandably not constantly on the watch for "readable copy." For that reason, many things which could put the public utility in an interesting and more human light in its own community escape the attention they deserve. Recently, a telephone organization decided to cultivate the news instinct by "case teaching" methods. Frederick W. Langbein, news service manager of the Chesapeake & Potomac Telephone Company, Washington, D. C., tells us about this enterprising experiment in an article which not only makes interesting reading but contains valuable suggestions for utility public relations people.



Also . . . **Special financial news, digests, and interpretations of court and commission decisions, general news happenings, reviews, Washington gossip, and other features of interest to public utility regulators, companies, executives, financial experts, employees, investors, and others.**



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Remarkable Remarks

"There never was in the world two opinions alike."

—MONTAIGNE

EDITORIAL STATEMENT
The Wall Street Journal.

"... immoderation can never be the solution of any problem, political or not, that affects people who differ as the people of this nation do."

WILLIAM F. LIBBY
Member, Atomic Energy Commission.

"Trained man power, not money, not uranium, is the single most important limiting factor for the future in the peaceful application of atomic energy."

HERBERT HOOVER
Former President of the United States.

"There is no joy in retirement except some kind of productive work. Otherwise you will degenerate into talking to everybody about your pains and pills and income tax ..."

DWIGHT D. EISENHOWER
President, United States of America.

"Victory is in a sense a contagious thing. In any sort of battle it leaps from platoon to platoon, from flank to center, until the whole front is alight with the determination to win."

JAMES O. EASTLAND
U. S. Senator from Mississippi.

"The Communist conspiracy can never succeed in America unless there is first destroyed the powers of the states. It can never succeed until the people are deprived of the power to control their local institutions."

LEWIS B. LUNDBORG
Vice president, Bank of America.

"Studies of reasons why executives fail in their jobs have shown overwhelmingly that it is not for lack of technical competence, but the lack of skill in human relations—for inability to deal effectively with other people."

LOWELL B. MASON
Member, Federal Trade Commission.

"It is all right for associations to hold conventions to report production and management improvements, but I believe the number one project on their agenda should be a constant lookout for the petty and insidious tyrannies that bureaucracy always is willing to hatch."

BEN MOREELL
Chairman of the board, Jones & Laughlin Steel Corporation.

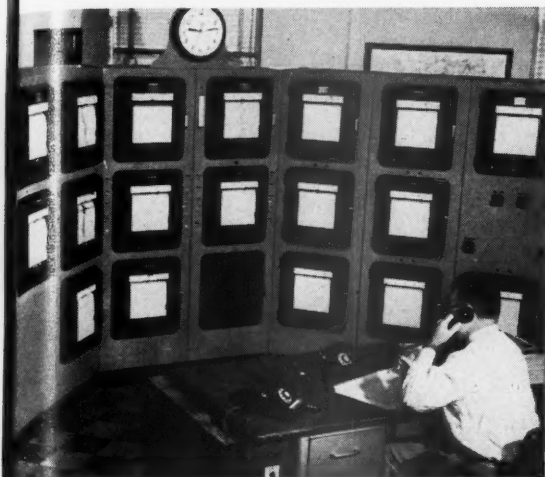
"The fact that the subsidized waterways will provide a route less costly to certain favored shippers is generally considered sufficient justification for the improvement; little weight is given either to the adverse effect on other carriers or to the burden on the general taxpayer."

JAMES F. OATES, JR.
Chairman of the board, The Peoples Gas Light and Coke Company.

"While there are problems of great magnitude always facing us, which challenge the very best that any of us can give, I have a hunch that we will always be fairly well equipped to make progress if we carefully select high-type employees, if we provide them with good training, encourage them to help themselves, and make fair provision for their security when their working days are done, because people are the important element of Peoples Gas."

How Bell System private line communications serve the power industry

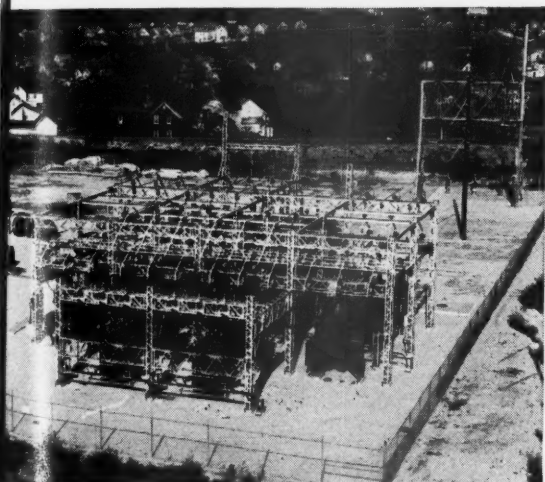
Bell System private line channels help streamline Ohio Edison operations 4 ways



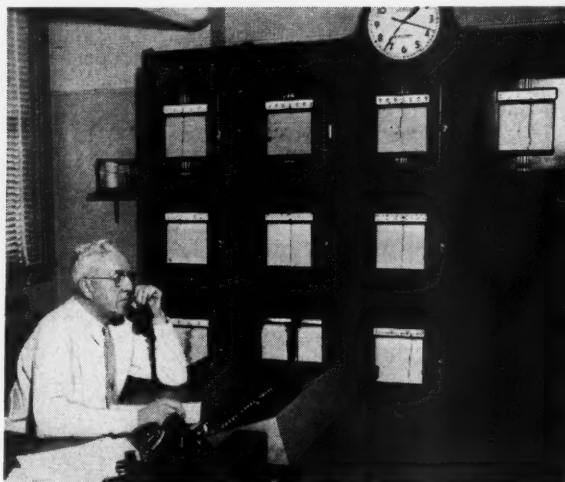
Continuous metering and load control of Ohio Edison's interconnected electric system is centered at the Company's central dispatching office in Massillon. Extensive use is made of Bell System circuits in this system.



2. Private line telephones form an important link between power plants (like the Niles plant, above) and the Massillon dispatching center, permitting close control of operations. The Edison Company serves more than 550,000 customers.



3. Bell System circuits for remote metering and control give the Akron division dispatcher an up-to-the-minute picture of conditions at substations in his area. Similar circuits also provide supervisory control over substations in certain other areas served by the Company.



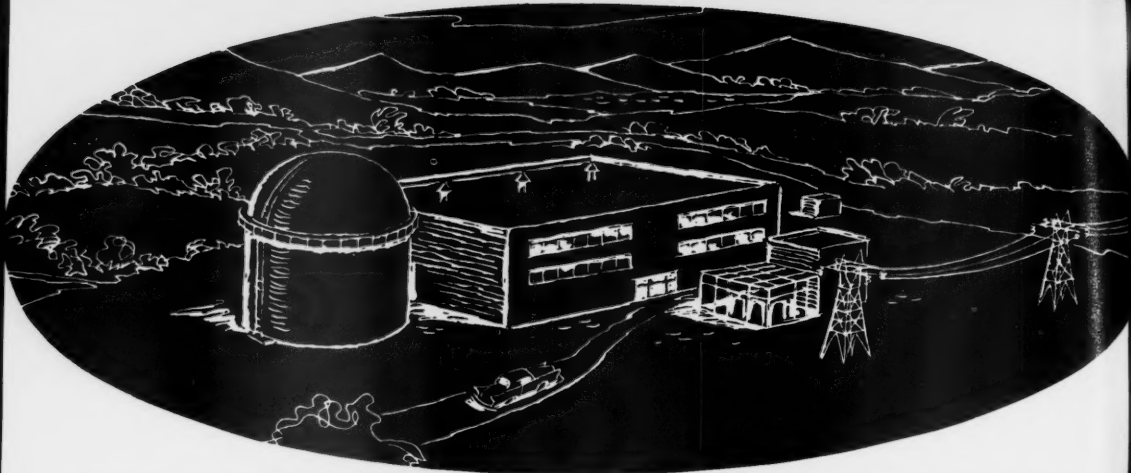
4. Audible indicating enables Ohio Edison dispatchers to pick up the telephone, dial certain unattended substations and learn from a tone signal the existence of trouble at that particular substation. This system provides an additional safeguard for service continuity.

Bell System communications can work for you just as they do for Ohio Edison. Call your Bell Telephone Company business office. A representative will be pleased to study your communications needs.

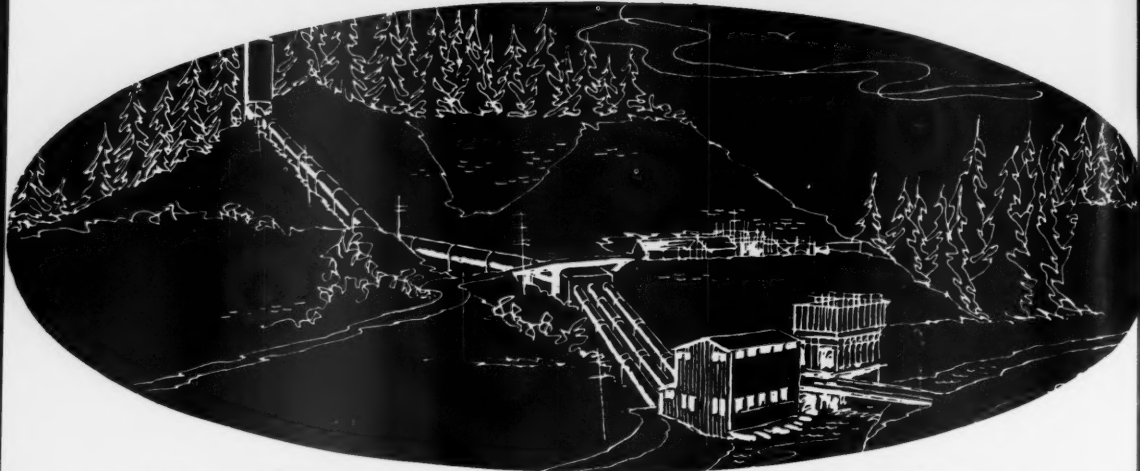
BELL TELEPHONE SYSTEM



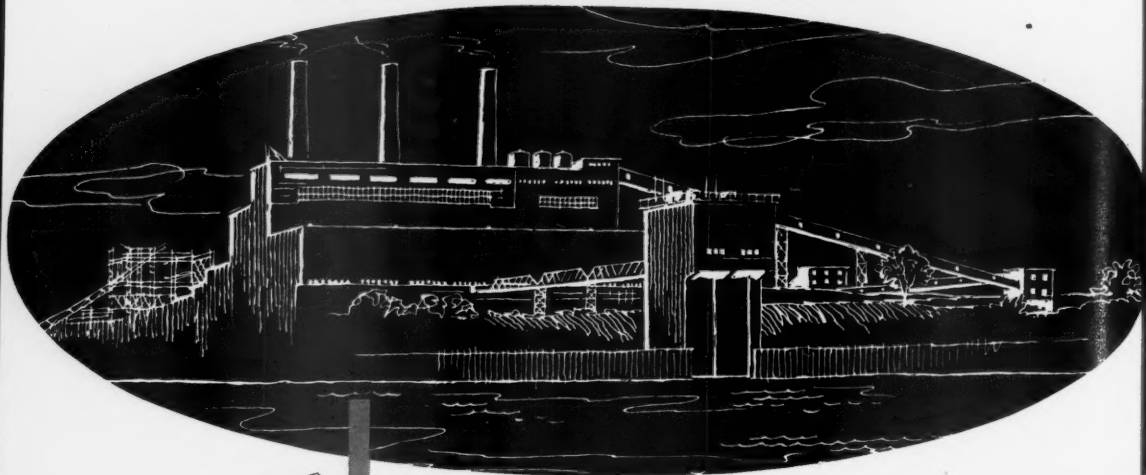
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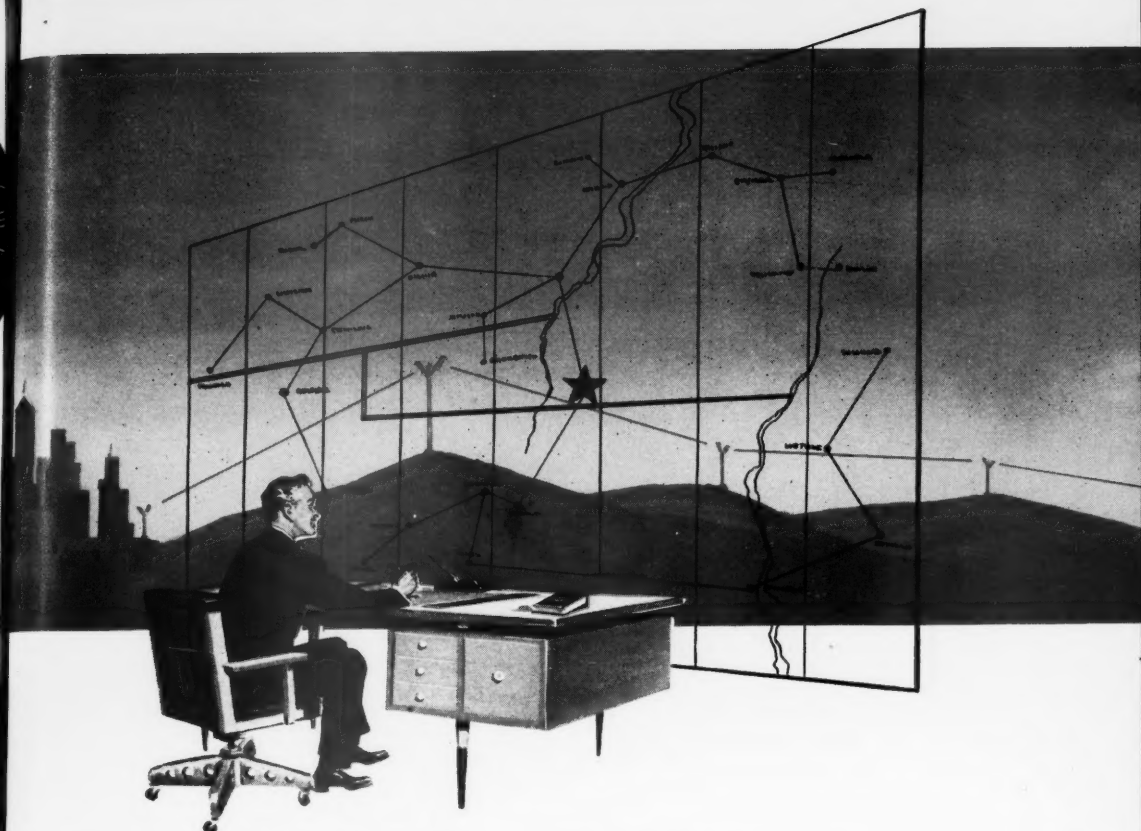


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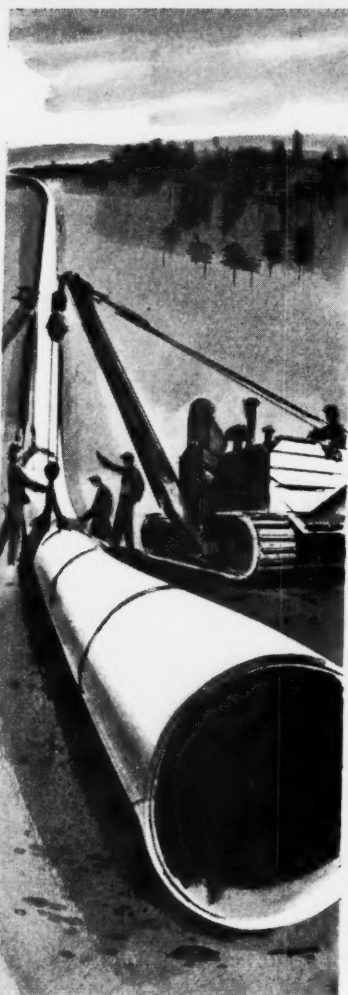
CONTROL SIGNALS

Read meters, turn valves, from any central location you want. With Motorola Microwave you can have supervisory control, remote control, and remote indication. Greater efficiency at less cost.



MOTOROLA MICROWAVE

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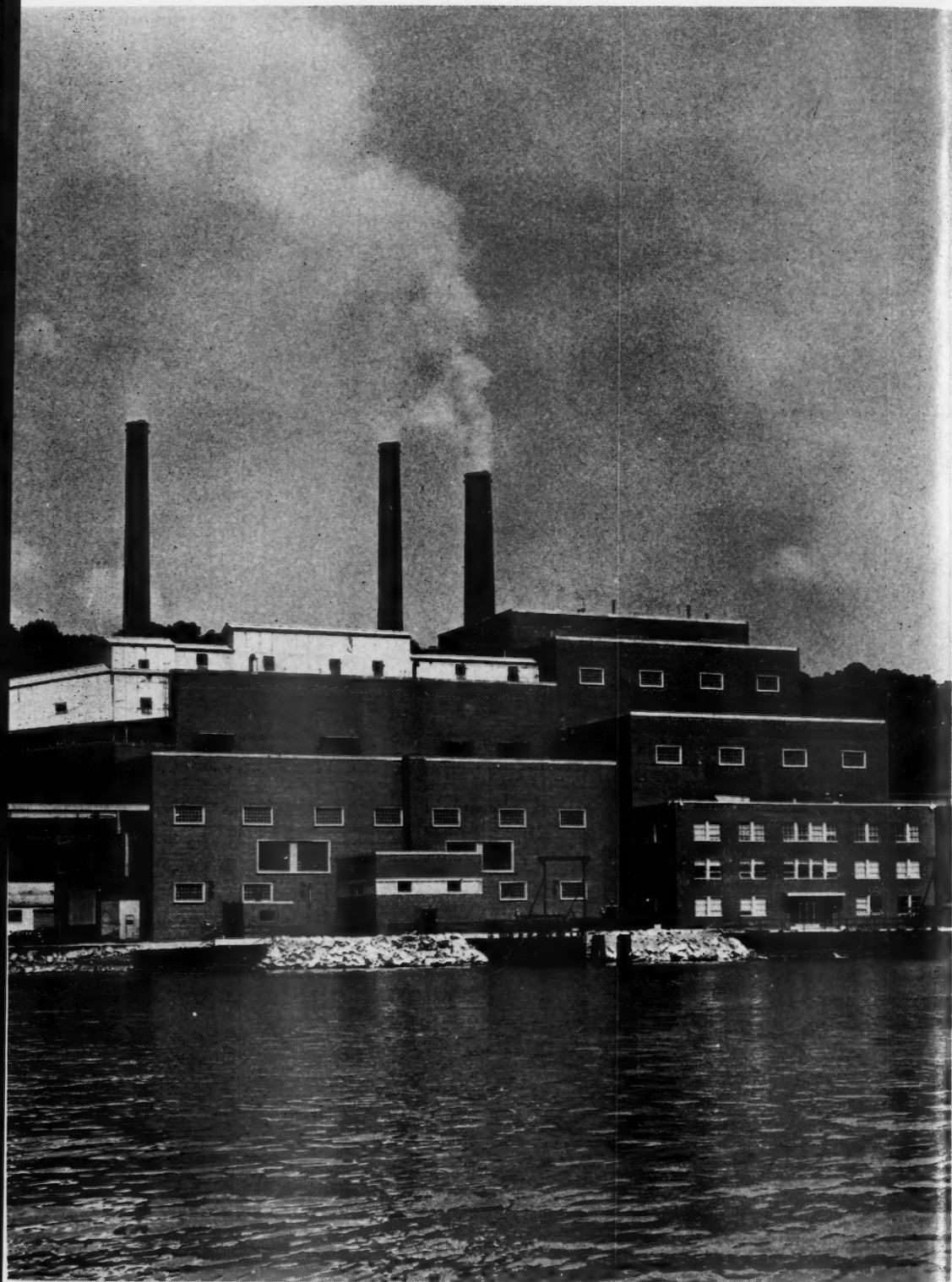
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

UTILITIES

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MARCH-APRIL

<p>Thursday—28</p> <p><i>Oklahoma Utilities Association begins annual convention, Tulsa, Okla.</i></p>	<p>Friday—29</p> <p><i>American Power Conference ends, Chicago, Ill.</i></p>	<p>Saturday—30</p> <p><i>American Institute of Electrical Engineers will hold Great Lakes District meeting, Des Moines, Iowa. Apr. 15-17. Advance notice.</i></p>	<p>Sunday—31</p> <p><i>Petroleum Industry Electrical Association-Petroleum Electric Supply Association will hold convention, Houston, Tex. Apr. 16-18. Advance notice.</i></p> 
<p>APRIL</p> <p>Monday—1</p> <p><i>Southeastern Electric Exchange begins annual conference, Boca Raton, Fla.</i></p>	<p>Tuesday—2</p> <p><i>Iowa Independent Telephone Association begins annual convention, Des Moines, Iowa.</i></p>	<p>Wednesday—3</p> <p><i>Indiana Electric Association begins annual Young Men's Utility Conference, Terre Haute, Ind.</i></p>	<p>Thursday—4</p> <p><i>Edison Electric Institute ends 4-day annual sales conference, Chicago, Ill.</i></p>
<p>Friday—5</p> <p><i>American Water Works Association, Montana Section, begins annual meeting, Great Falls, Mont.</i></p>	<p>Saturday—6</p> <p><i>Rocky Mountain Electrical League will hold spring conference, Denver, Colo. Apr. 21-24. Advance notice.</i></p>	<p>Sunday—7</p> <p><i>National Association of Radio and Television Broadcasters begins annual convention, Chicago, Ill.</i></p> 	<p>Monday—8</p> <p><i>Gas Appliance Manufacturers Association begins annual meeting, White Sulphur Springs, W. Va.</i></p>
<p>Tuesday—9</p> <p><i>American Welding Society begins welding show, Philadelphia, Pa.</i></p>	<p>Wednesday—10</p> <p><i>American Water Works Association, Kansas Section, begins annual meeting Wichita, Kan.</i></p>	<p>Thursday—11</p> <p><i>American Gas Association ends 4-day distribution, motor vehicles, and corrosion conference, Houston, Tex.</i></p>	<p>Friday—12</p> <p><i>Maryland Utilities Association begins annual spring business conference, Baltimore, Md.</i></p>



Courtesy, Rockland Light & Power Company

Steam Plant on the Hudson

This Tomkins Cove (New York) station serves a fast-growing territory.

Public Utilities

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Compensating for Shortages Of Utility Engineers

This author, who has written several books on employee relations and personnel matters in the utility industry, has some suggestions of value for management people who are confronted with the problem of filling the gap caused by the shortage of trained engineers.

By ALFRED M. COOPER*

THROUGHOUT the electric power industry shortages of engineers can no longer be considered acute. This condition has now become chronic, and if we may assume continued full employment, the situation cannot at once be improved.

There have not been enough competent engineers—electrical, mechanical, civil, et

cetera—to go around since 1950, and, as a result, the old Army personnel game of enticing good technical men away from power companies by competing industries has of necessity been perfected to a fine art. Great aircraft companies even run display advertisements in magazines of mass circulation, designed to persuade utility engineers to try new fields at very high salaries.

The electric utility shares in the na-

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tion's general prosperity, but it is not in a position to bid salarywise against those corporations which have been allotted \$40 billion in federal funds for defense contracts.

IN prewar years our colleges were turning out a superabundance of engineers. Technical men often were a drug on the market and were being hired for every type of menial job. Engineers were then being employed as helpers in powerhouses. They were being employed as clerks in power companies and throughout the electrical industry.

But during and after World War II our need for technically trained men mushroomed. Fortunately, in the immediate postwar period the GI training program functioned to meet this increased demand.

However, in 1950 we hit a peak of nearly 53,000 engineering graduates in the United States. Since then, year after year, the supply has diminished—to 42,000 in '51, to 30,000 in '52, on down to 22,500 in '55. This, through years when over-all employment has steadily continued to increase, and when the need for every type of technical help has risen at an even faster rate, has left all of our industries suffering an acute shortage of 20,000 engineers.

Traditionally, our electric utilities have been granted first choice among engineering graduates, along with the electrical manufacturing companies. But now this is no longer the case. Corporations primarily engaged in manufacture of airplanes and munitions of war are in a position to outbid the utilities for the best technical graduates.

Any lasting cure for shortages of engi-

neers must, of course, take the form of better teamwork between those authorities in our high schools and colleges who are responsible for vocational guidance and curriculum building, and those experts in industry and government whose business it is to prognosticate the rate of growth within our industries. As of now it would appear that we have all been a bit over-cautious for at least ten years in our estimates of future man-power needs.

THE largest employers in the electric power industry have each year taken the cream of the new college crop of electrical engineers; yet even the largest of these manufacturers now experience difficulty in satisfying their replacement and expansion needs in this field. *Both General Electric and Westinghouse have found it imperative to institute programs designed to compensate for shortages of engineers.*

It therefore becomes interesting to note the many ingenious methods that have been adopted in large corporations in compensating for such shortages. Certain of these devices may be utilized in either large or small plants or utilities; some of them, because of the cost involved, are applicable only to the larger companies.

Thus, companies as diverse in product and size as Westinghouse Electric Corporation and Monarch Aluminum Company, Cleveland, are now upgrading shopmen to make them available as assistant engineers, paying all tuition costs for those who are attending university extension courses. Westinghouse also offers scholarships to high-school students and supplementary study for engineers. Twelve hundred engineers are taking such courses at Westinghouse.



Raiding the Engineer Preserves

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In this manner, both large and small plants find it practicable to encourage high-school graduates among their employees to continue their education through university extension courses. All tuition costs for such engineering courses are defrayed by the company, and scholarships are awarded employees *who have been selected as demonstrating unusual potential leadership ability*. Such men, after graduation, are to be given special consideration for promotion to executive rank. This entire tested plan is applicable to every public utility corporation in America.

AGAIN, where there are universities located nearby, manufacturing plants are hiring engineering students from these

schools as part-time employees. Pneumatic Tool Company, for example, places student engineers from local Fenn College and the University of Detroit. In this instance, the students go to school for six months and thereafter work six months at the plant. These student engineers relieve plant engineers of drafting and similar onerous routine tasks.

Also, from among these students an effort is made to choose those who will qualify as permanent members of the company's engineering staff after graduation. This method of meeting shortages has the additional advantage of functioning as an on-the-job orientation school for new engineers, and in the smaller plants makes it easier to secure the services of good engineers, already grounded in company

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routines and policies, when these part-time employees graduate. Here, again, is a complete, workable plan that can be tailored to fit any utility organization located in the same area as good technical schools.

Last year, United Aircraft found it possible to obtain but 169 engineers from the colleges out of a "must" quota of 300 engineers. This company feels that opportunity for advanced study is an essentiality, and the absence of universities located near its plant was a factor in making it difficult for it to secure engineers.

HOWEVER, Rensselaer Polytechnic Institute was persuaded to co-operate with United Aircraft. In this instance the technical school opened a branch graduate school at South Windsor, Connecticut. The aircraft company is contributing \$260,000 to this project, and expects to have 300 of its engineers enrolled there in graduate school. At Pittsburgh, Westinghouse offers a program of graduate study within the company. In instances, either of these schemes may be adapted to the public utility organization.

Personnel officers contend that where it is possible to select and upgrade employees within the ranks (converting high-school graduates into graduate engineers) it becomes practicable to secure, *not only proficient engineers who know their way around the particular plant or utility, but better material for promotion to higher executive positions.*

Obviously, either the upgrading of shop employees or the hiring of part-time student engineers may be preferable as a method of selection to employing bottom of the barrel among the annual crop of engineering graduates. And this may be

all that is available today to the small utility corporation.

Again, existing engineering shortages have been alleviated in larger plants by selecting nonengineering graduates from among the shop and office employees—preferably those who have majored either in mathematics or physics—and training these as engineers. It has been found that intensive five-month courses *within the plant* can convert such men into capable engineering assistants. Here again, it is possible to screen these men more carefully for their leadership qualities. This plan may be readily adapted to the average-sized utility corporation.

WESTINGHOUSE thus is training non-engineering graduates and using these men on quality control, production scheduling, and other jobs previously held by engineers. Engineers' Joint Council has been devoting much study to the problem of developing engineering assistants and determining the proper scope of their duties. Guy Kleis, manager of central technical departments at Westinghouse, says that the principal province of the engineer is in work calling for original thinking. Westinghouse wisely does not insist on college degrees for candidates for such training as mentioned above, if other qualifications are high and the employee has potential leadership qualities. Northrup Aircraft and General Electric are using such specially trained nonengineers to write all technical reports.

Always in such cases the larger corporations have the advantage, since these can better absorb the cost of an elaborate, formal training program. But when training of this type can be given it has been found practicable to assign two or three

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such nonengineering graduates as assistants to each engineer, thus relieving the staff engineers of much detail work and freeing their time for broader, more vital phases of design activity and field engineering.

IN general, personnel executives are beginning to look with definite disfavor on the practice of employing engineering graduates as draftsmen. This time-honored method of inducting engineers into industry, yet in practice in many utilities, is now considered wasteful of skills that are in too short supply. It has been found that high-school graduates can be readily developed into competent draftsmen, and this again permits the engineer to concentrate his entire efforts on legitimate engineering work. It has also been found that too many years of routine work at a drafting table may hamper the engineer for imaginative design effort or for important field work. The research director of a large automobile company says that it no longer employs engineers as draftsmen, and Lockheed Aircraft also is substituting nonengineers as draftsmen.

Then, too, it has been ascertained that the time of too many engineers in our utilities is taken up with detail work of a purely clerical nature which in itself does not call for engineering skill. This may include the operation of computing machines, and it has been discovered by General Electric and other companies that no sacrifice in efficiency results when experienced women computing machine operators are substituted for engineers who have been handling this nontechnical work. In studies, Westinghouse Electric Corporation has found that substituting nonengineering personnel for engineers

has resulted in savings up to 23 per cent of engineers' time.

IN connection with this general shortage problem it frequently develops that *job specifications are found to call for engineering degrees when the work in many instances could as well be handled by those of lesser attainments.* This is, of course, a carry-over from the days of surpluses of technical help, when it would often be said, "It would be nice if we could have engineers on this job." But when engineers are in extremely short supply it becomes evident that many such jobs actually do not call for the training of an engineer, and those of lesser degree of education can be substituted. As of now, most utility personnel managers are saying simply, "It would be nice if we could have engineers for all *engineering jobs.*"

Whether by substituting men and women of lesser qualifications, or by upgrading present employees into engineers or assistant engineers, anything that frees the utility's engineering force from duties that can as well be handled by others certainly increases the effective supply of engineering talent available.

Most experts caution that efforts to induct too many nonengineering employees into engineering work may have a deleterious effect on the quality of imaginative design and field work. In the long run, the answer to engineering shortages must of course take the form of guidance of more students into this field. Shortage problems must be met and overcome as they arise, but the scarcity itself should be corrected as soon as possible.

For some time, undoubtedly, the impression prevailed among vocational counselors and federal labor experts that the

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GI training program following World War II might well flood the labor market with engineers, and college freshmen and high-school students were cautioned not to prepare for an overcrowded profession.

It is also unfortunately true that there has occurred a shift of emphasis in high-school curriculum building which must, if continued, affect adversely the number and quality of entrants into our engineering schools. As one instance of this, nearly 1,500 of our high schools in 1955 *dropped courses in mathematics and science*—courses of study which are of course fundamental for preparation of entrance into any engineering college. It would be interesting to know what courses of study were substituted for these.

Dan A. Kimball, president of Aerojet-General Corporation, points out that the design time of engineers on a typical pre-war airplane was 95,000 hours. During the war this figure rose to 400,000 hours. Now, however, it averages something like 730,000 hours, and in some cases much more than this. But Mr. Kimball also points out that a recent survey in the communities near Aerojet's plant indicates that, although the enrollment of the public high schools has increased sharply during the past ten years, the annual number of students studying such subjects as trigonometry, solid geometry, physics, and advanced physical science, has decreased by 41 per cent. Something like this has been happening all over the country.

If an effective effort is made to remedy this situation by inducing more high-school students to study pre-engineering subjects, our educational plant eventually will catch up on shortages of engineers. As of this writing, the U. S. Office of

Education reports that students continue to show little interest in the "tough" elective courses mentioned above. One spokesman there says that "an increase of one per cent in such enrollments this year would be startling."

In the interim, one or more of the remedies that have been suggested, which have been found effective in a number of plants, large and small, may serve in helping our utilities to spread too few engineers over a plethora of engineering jobs.

In some cases, too, it will be found that the emergency changes which are being put into effect (such as substitution of women computing machine operators for engineers and the employment of non-engineers as draftsmen) may be considered so effective and economical that engineering skill hereafter will not be dissipated on these less demanding jobs. Likewise, any system that is developed for upgrading employees already on the payroll may be well worth continuing in effect. Particularly is this true when such a program has for its ultimate objective the development of future executives. The public utility has never had quite enough material from which to shape a sufficient number of topflight executives.

IN any event, if the existing shortage of engineers in our utilities, and in industry generally, results in the development of superior methods of allocating trained man power to jobs calling for such training, the present emergency may have been well worth while. In the years ahead it may be dangerous for the United States to waste its man power, and this will be particularly true in the case of highly skilled man power.

An Expanding Kilowatt Economy

The picture drawn in this article on the expanding status of the electric utility industry in our American economy is one which will be of interest not only to the electric utility people but to those engaged in other public utility work, as well as the regulators.

By EDWARD A. FONTAINE*

JUST as an army travels on its stomach, so the U. S. grows on its power plants. The economic development of the country has become so intricately entwined with the availability and use of electricity that to deny the one is to preclude the development of the other.

Looking to the future, industry leaders, government officials, and a host of economists foresee with virtual unanimity a continuation of the nation's economic expansion. Where there is disagreement,

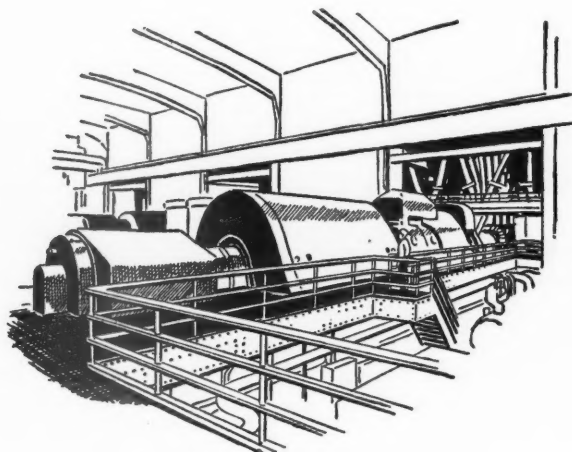
apparently it concerns only the details.

In broad terms, the foregoing should define the future of the electric industry and the immense scope of the job ahead, for the U. S. economy is a long way from reaching its zenith.

Within the industry itself there is not complete agreement on how best to prepare for the electrical world of tomorrow. The conservative view asks "Does the industry, even today, have an overactive thyroid?" The more liberal stand is "Damn the torpedoes," etc., etc. Somewhere within these limits lies the answer.

The United States, a "growth" nation

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from the start, has excelled in the family of nations by adopting quickly and in great quantities new forms and sources of energy and new ideas. It did fairly well with hand labor and horsepower, but it did even better with the internal combustion engine and steam. And with the emergence of electric power in 1879, it leapfrogged ahead at a rate that even now shows few signs of diminishing as far as can be seen. After seventy-seven years, during which all the world had equal chance for its use, the U. S. still produces more electricity than Russia, England, Canada, West Germany, Japan, and France combined. To assume our growth has now leveled off is not consistent with reality.

IN a succession of forecasts the picture has been assembled, reviewed, analyzed, dissected, scrutinized, and otherwise evaluated. The findings are usually the same. The state of the nation is good and the future of the industry is bright.

There is no discernible reason for a policy of retrenchment in the electric industry.

The experts who are involved in forecasting loads and requirements have had the experience that no matter how optimistic their estimate, actual results have been in the habit of exceeding what had been considered a good forecast. The industry has been growing faster than expected and it is conceivable that hindsight a few years from now may show that 1957 estimates were too low.

Worth noting are some of the factors which have caused the industry constantly to raise its sights in predicting the future. Economic pressures exerted on our nation's industries have dictated advances in

production techniques to offset the rising costs of production, particularly since the last war. Automation is a common term today and it requires an ever-increasing amount of electricity with which to do the job of raising productivity levels. Our population has constantly demanded products which have become more complex to produce, required precision in manufacture, and have had to be turned out in larger volumes to satisfy growing demands. An example of this development is the automobile of today which costs more than that of twenty years ago but which is a vastly superior product. Another striking illustration is the automatic clothes washer as compared with its predecessor of the thirties.

CONSTANT research has created new industries. The rapid advances of the petrochemical and metal industries are examples which have left their mark on the growth of the electric industry. New discoveries and applications are taking place today in all forms of endeavor. We can expect that more and better things will be made available for our comfort, safety, and national protection, and producing these things will most certainly show an increasing dependence on electricity. It may well be that the prime element which rendered previous forecasts of growth inadequate was that insufficient weight had been assigned to the creative rôle of our nation's industries. Although recent predictions have "room" to accommodate the energy requirements which new industries will need, it is possible that we shall again have to raise our sights.

To probe further into the dynamic character of the electric business, a look at history can be illuminating. The indus-

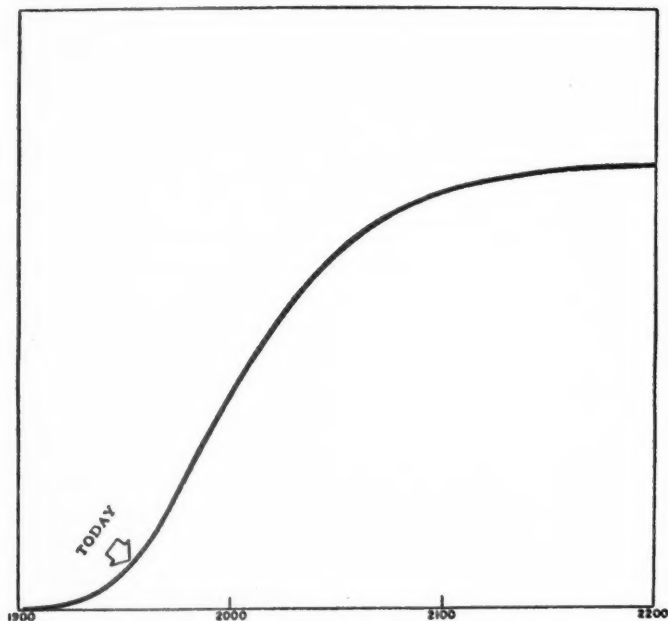
AN EXPANDING KILOWATT ECONOMY

try's Golden Anniversary was celebrated in 1929. In the preceding fifty years it had passed through the pioneering stage and had embarked on its selling, financing, and construction missions. What then ensued is well known to all. The period following 1929 produced twenty years of the most violent economic upheavals the world had ever known. From the deepest and most widespread depression in history, the world was plunged into an era of armed conflict from which it has yet to recover fully.

IN the intervening years the industry did its job admirably, but only in recent years has it been able to resume its mission of selling, building, and financing the kind of development that was well under way over a quarter of a century ago.

It is small wonder, then, that unshackled by war and depression, the industry has toppled like tenpins most of the recent forecasts of our present electrical requirements. It seems increasingly clear that the records of these recent years should be given special consideration in appraising the future. For, superimposed on the normal population increase, are twenty years of development frustration, during which customers either were unable to buy for reasons of economic privation or were not permitted to purchase because of the necessary restrictions of a wartime economy.

In the past decade residential sales increased more than 253 per cent, commercial 165 per cent, and industrial use, which took 52 per cent of total sales in 1955, has increased 132 per cent. These were years



Long-term growth pattern for the electric utility industry showing that at present it is in its "growing teens."

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which included postwar recession and the Korean conflict. Historians may record this as the last period when serious efforts were made to shift alternately from a peacetime to a wartime economy. Apparently we have now been successful in creating a war-peace economy in which we are able to sustain a military-in-readiness, while at the same time boosting civilian living standards to the highest level in history.

IN the years ahead, despite the heavy demands of industry, the experts expect residential use to show the largest percentage increase. From about 3,000 kilowatt-hours per customer in 1956 the average is reasonably expected to climb to about 6,000 in 1965 and 8,100 in 1970, or an increase of 170 per cent. Commercial and industrial growth have also been pegged for impressive gains and the underlying reasons for the increase in all classes have been well documented.

An examination of the long-term pattern of growth for the electric utility industry and of its current position on the growth curve reveals that the day when the demand for electricity in this country will level off lies in the far distant future. The industry has left its infancy and has reached a stage in its life which can be labeled "the growing teens."

Automation, electromatic living, cost-of-living index, increased usable income, gross national product—these and other terms have become common expressions in the business world. They comprise the lexicon of the experts and spelling them out makes the case for the electrical world of tomorrow. It is an almost limitless tableau and is a challenge to utility leadership. As the future unfolds, we may ex-

pect the electric industry will continue to play a key rôle in the nation's development. The \$64 billion question is: "Will the industry lead or lag in that development?"

OF equal importance to the educated guesses on future goals is the necessity for attaining these goals. It is a necessity born of the fundamental rôle of electricity as a curb on inflation. Among our economic ailments there is perhaps none more serious than inflation. Wage increases are reflected in higher prices, which in turn result in wage increases, and so on. Efforts to control inflation are being made and represent several different economic viewpoints, among which is control over the cost of money. But the most important factor in controlling inflation is stepped-up production coincident with any wage increases, and electricity is the prime factor in increased productivity. The ingenuity and attitude behind that achievement are the greatest reasons for America's industrial pre-eminence. The constant competitive pressure on American industry to produce more and better goods per man-hour can mean nothing more than a demand for greater electric output.

Added to this is the very considerable portion of our annual production which goes for military goods. While necessary, they are for nonproductive purposes and their production is inherently inflationary. Here, again, electricity fulfills its rôle in the battle against a cheapened currency.

THE nature of the job ahead and how to do it are already looming large on the horizon. Additions to generating fa-



Relationship of Kilowatts to Progress

“JUST as an army travels on its stomach, so the U. S. grows on its power plants. The economic development of the country has become so intricately entwined with the availability and use of electricity that to deny the one is to preclude the development of the other. Looking to the future, industry leaders, government officials, and a host of economists foresee with virtual unanimity a continuation of the nation's economic expansion. Where there is disagreement, apparently it concerns only the details. In broad terms, the foregoing should define the future of the electric industry and the immense scope of the job ahead, for the U. S. economy is a long way from reaching its zenith.”

cilities in 1957 will amount to approximately 10 million kilowatts. By 1970 these additions should be at an annual rate in excess of 25 million kilowatts. The capacity additions of the future must consist of larger units than those installed in the past since the economics involved in providing generating units is related to load growth and as the load increments grow, larger units are justified. Accommodating these new additions will require more plant sites and new sources of water sup-

ply, already a problem in many sections of the country. Careful planning and foresight will be required to assure the installation of this new capacity.

With the tremendous increase in energy requirements, where will the energy come from which will be consumed in the production of these large blocks of power?

FOR some years to come the nation's power needs will continue to be obtained from fossil fuels and hydro sources. As

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economical hydro sites decrease in number, we can expect that an increasing percentage of our generation will come from thermal and nuclear generation. Coal will play a more prominent rôle in the supply of energy. Last year some 55 per cent of all kilowatt-hours produced by the electric utility industry came from coal. As oil and natural gas, the other members of the fossil fuel family, remove themselves from the boiler fuel class due to their inherent qualities, power stations will consume greater quantities of coal. Close co-operation with the coal industry is of utmost importance to assure an adequate supply.

OIL and gas reserves, unlike our nation's coal reserves, have limits which will be reached much sooner, and conservation measures will be needed to preserve them for purposes other than boiler fuel. Economic factors will produce automatic conservation to a certain extent, for with limited supplies the law of demand and supply will eventually price these fuels out of the boiler fuel market.

The development of nuclear energy appears to be the ultimate answer to the utilities' energy supply problems. Other sources of energy, such as solar, tidal, or wind, have possibilities but cannot approach the potential afforded by nuclear energy. The timing of its arrival as a supplemental energy source could not be better. The atomic age is with us and the electric utility industry is paving the way to adapt itself to this new source, the development of which was advanced to such an extent by the events of the last war.

The reactor program, as it concerns itself with electric generation, must be developed with all deliberate speed. Proper regard for the responsibility of serving

the public at reasonable cost must be a part of the program. The larger companies are already contributing funds and manpower for research and development. All utilities have the responsibility of educating their personnel on the meaning of atomic power, so as to provide the answers for a curious public. As research progresses, alternate means of harnessing the nuclear force for power generation will become available and eventually will produce the best possible method adaptable to the industry. The status of our nation's power supply now, or in the next ten years, does not dictate a "crash" program for nuclear power development.

CONTINUED research and further development of conventional generating equipment must take place since ultimates have not been achieved in the design of such equipment. Higher pressures and temperatures, with resulting increases in efficiency, are still possible. Notable advances have been made in power plant design in recent years, but there is still room for improvement. As late as 1950 there were only two plants in the entire U. S. producing power at less than 10,000 Btu per kilowatt-hour. Today there are nearly 50.

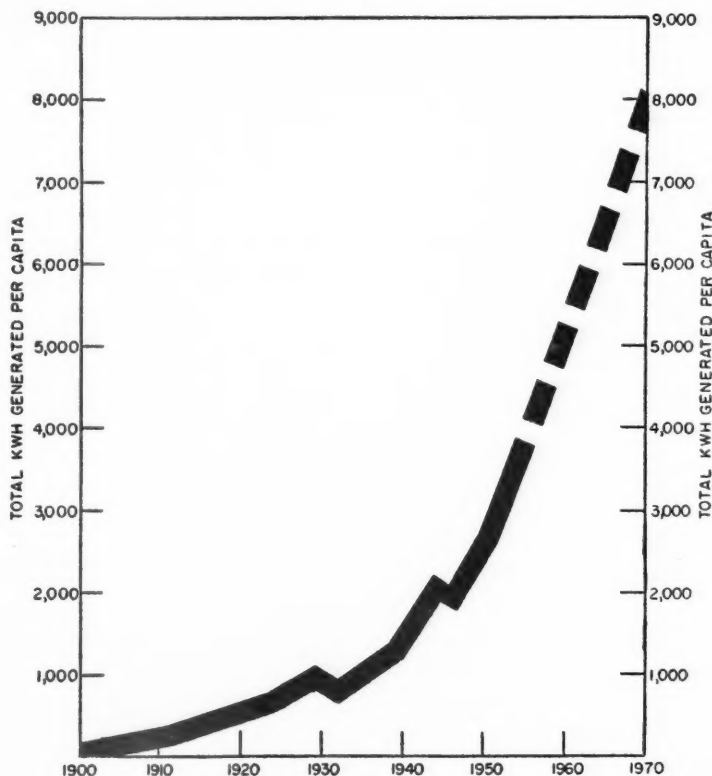
The movement of large blocks of power from remote generating sites to load centers will require a careful appraisal of future transmission facilities. Distribution systems will have to be expanded and rebuilt to carry larger loads to customer premises. Wiring facilities of customer premises will become a more critical bottleneck and the utility industry should step up its co-operative program with the nation's electrical contractors to raise current-carrying capacities to adequate levels.

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The electric utility industry cannot undertake the task which lies ahead without a supply of man power trained to do the job. New leaders will be needed and specialists will be required in various phases of utility endeavor, particularly with regard to nuclear power developments. Emphasis in the future must therefore be given not only to getting the equipment to produce and market electricity, but also to the training of personnel to undertake these broad new responsibilities. Improvement of system load factors, the furnish-

ing of leadership to the thousands of appliance dealers and equipment suppliers, and close co-operation with industrials to improve operations constantly by the use of electric power are only a few of the problems requiring constant attention.

WE have not reached the limits of automation within our own industry and there is considerable space left to produce economies and to render better and faster service to the public through mechanized methods. Accounting and office



Electric energy requirements per inhabitant have shown a rapid climb during the past decade and are expected to exceed 8,000 kilowatt-hours by 1970.

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procedures, load dispatching and control switching, materials handling, and almost any repetitive task have lent themselves to mechanization. We must be alert to continue the progress made along these lines to give to the American public the best electric service at the lowest possible cost.

If there is one thing above all others that will be required in the future as it is today, it is the talent for bold, long-range planning. A blueprint of the future, ten, fifteen, or even twenty years ahead, can give direction and purpose to utility growth and there is mounting evidence that it will be a "must" for successful operations in the future.

The needs of tomorrow are well known today to many utility managements and much already has been accomplished. Recent developments indicate that these utility managements are even now on their way. According to a recent report by the power survey committee of the Edison Electric Institute, there were on order some 38 million kilowatts of generating capacity scheduled for delivery during the next three years. To meet these orders the country's leading manufacturers of steam- and hydro generating equipment will be able to produce by 1959 at the rate of approximately 20 million kilowatts annually.

THE private utility industry has already invested some \$300 million for atomic power research and development and is embarking on joint programs with other interested parties in pushing the atomic power program as fast as conditions will allow.

Large utility systems are placing orders for conventional generating units in larger and larger sizes. Several 225,000-kilowatt

units are scheduled for delivery soon, 300,000-kilowatt units should be in operation in the next two years, and delivery of units in the 450,000-kilowatt class can be expected before 1960.

Hydro developments of economical sites in the Northwest and elsewhere are proceeding rapidly and studies and planning are being undertaken to take full advantage of the few remaining sites.

Interconnection of large and small power systems is taking place to strengthen power supplies and permit economic use of larger generating stations. We can expect that the trend toward integration of our nation's power facilities will continue and that joint participation by several systems in the installation and operation of large generating stations will help solve economic problems confronting certain areas, particularly those served by smaller systems, in making available to as many customers as possible the advantages of economical electric living.

IF this year's forecast takes you fifteen years into the future and leaves you gasping, you can bet that the next will take you twenty years ahead and leave you breathless. And, as noted previously, the industry has made a habit of exceeding the once optimistic forecasts much before the time has run out. One forecast, made in 1955, of generating capacity expected to be needed for 1970 was twelve months later revised upward by 40.3 million kilowatts or 12.6 per cent.

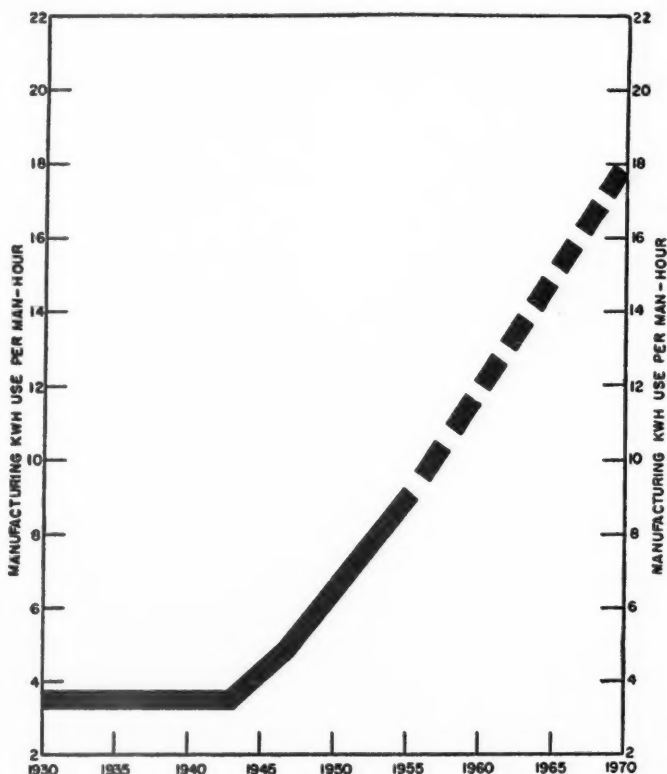
This is not to say that extra-long-range forecasting on a national scale is without merit and should be discontinued forthwith. It has morale value and, as such, is extremely important though difficult to measure. Of vastly greater importance is

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the necessity for each utility company to develop the talent for accurately forecasting its own requirements and then providing the facilities to get the job done.

Utility management for many years has been a combination of engineer, financier, salesman, and chamber of commerce. It is not generally recognized that, in addition to these, management has also been an economist, not always a good one, but none the less it has been an economist. For the future it is going to have to be, among other things, a very good economist.

NATIONALLY, our population is expected to increase by approximately 2.4 million a year, reaching a total of 200 million by 1970. The needs and wants of the increasing population, plus industry's drive to supply them and the methods it uses to produce them, constitute the utility industry's bellwether for the future. Whether this means 300 million kilowatts of installed capacity and \$30 billion of capital or 400 million kilowatts and \$40 billion is of incidental concern to the public. Of this we may be sure: The public will be served and if management, as it is



To produce our nation's goods the quantity of electricity per man-hour by 1970 will more than double its present level.

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now known, is not equal to the task, "there'll be some changes made."

The total national picture, compared with the past or projected into the misty future, is of most value to historians and statisticians. For local utility problems, however, its value is roughly equivalent to the statistics on trout streams, the classic example of which showed an average depth of two inches. Unhappily, this was small comfort for the man who drowned in the middle where it was 12 feet deep.

ONE outgrowth of the American scene we describe is the highly mobile nature of not only our people but our industry. Both are continually on the move. Both have large appetites for electricity. As a result, regional power requirements are affected by economies and climatic forces existing in various areas. For example, the tremendous increases in population in Florida and California and the industrialization of the Northwest and South Central regions created local power supply problems of herculean proportions. The electric utility industry can expect more of these challenges due to the migra-

tory nature of our economy, challenges which were met successfully in the past. But each individual operating utility has its own particular brand of problem and its own future, peculiar only to itself. Management in each case must be capable of assembling and correctly interpreting the myriad economic and political factors which point the way in our ever-changing scene.

VIRTUALLY an entire generation of utility management has operated in an era beset with the stultifying effects of depression, war, and the onslaughts of political ideologists. The record of fulfilling its utility obligation in such an atmosphere has been uniformly good. Now, it appears, the U. S. economy has been stepped up to accommodate both the demanding requirements of military preparedness and a continually rising standard of civilian life. The challenge of the future may appear formidable from a 1957 perspective but, with such a background of achievement, there is good reason to believe the electric utility industry will be more than equal to the task.

"IN corporate affairs, business is risk-taking.

"Part of the reward to owners, or shareholders, is compensation for assuming economic risk.

"It is a distortion of fundamental economics to create the illusion that picking a good chief executive converts a speculative position into a sure thing.

"Extravagant claims of omniscience are self-defeating. For when the tide ebbs, executives, who have been oversold, are subject to unreasonable attack by outside raiders eager to exploit passing troubles.

"A scientific statement of the realities is that management is in effect serving as the trustee for the owners, or shareholders. The trustee is expected to display prudence, competency, and common honesty, but this formula does not mean that, in assuming the risk of making current appraisals of coming events, he will always hit the bull's eye."

—M. S. RUKEYSER
Columnist.



Results of Low-cost Federal Financing Of Hydro Projects

This author is quite frank about his preference for public ownership and operation of the electric utility business. He further makes it clear that he is for the welfare state. In the process he develops some provocative arguments in favor of low-cost federal financing of hydroelectric projects.

By JOHN BAUER*

THE leading article in PUBLIC UTILITIES FORTNIGHTLY, November 22, 1956,¹ attempted to show that federal financing of hydroelectric projects, at low interest rates, subsidizes the favored consumers of electricity, through induced inflation at the expense of other people and the country at large. The author is Professor Leland B. Yeager, assistant professor of economics, University of Maryland.

In summary, Professor Yeager postulates that low-cost government financing neither promotes physical efficiency in power production nor induces saving by

investors for availability of funds for capital formation. Therefore, he concludes that "the benefits of cheap power must be at somebody's expense. But whose?"

"Cheap finance cannot give something to somebody without taking anything from anybody. . . . The government can provide artificially cheap electricity to some people only at the expense of others." Assuming a self-evident answer, he asks: "Does the government make capital cheap by making it more abundant? Or does it simply divert capital from other and perhaps more urgent uses?"

Now, one can agree, with some reservations, that federal financing would not induce increased saving by investors or greater efficiency in power production.

* Economic consultant and author, with offices in Chatham, New Jersey. For additional personal note, see "Pages with the Editors."

¹ "Low-cost Financing of Hydroelectric Projects," by Leland B. Yeager. Vol. 58, No. 11, p. 809.

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But the conclusion that, therefore, federal financing, which benefits some people, must necessarily cause inflation at the expense of other people, appears to be *non seq.*

THE consequence of federal financing, I submit, depends on follow-up developmental results of the particular projects. If the federal financing results, as would naturally be expected, in breeding and promoting extensively supporting economic activities, it will not induce general inflation at the expense of others. On the contrary, it might have a deflationary effect, following great area-wide upsurge of other public and private enterprises induced by the federally financed project.

Of course, if the project, as publicly planned and financed, should in fact fail to promote and support the expected area-wide economic developments, the financing would doubtless have an inflationary effect. But this would not be different from the results of private financing at higher interest rates in the case of unsuccessful undertakings, as was evidenced by the great sprees of holding company financing during the 1920's and the subsequent collapse of the inflated public utility empires.

Naturally, government financing should relate to projects that have been competently planned in regard to their expected follow-up growth of economic activities. While mistakes in planning can be made, they are not likely to be extensive and in the aggregate will not contribute to the inflationary forces that produce upsets in the over-all economy.

As yet, I would say, federally financed hydroelectric projects have not had the inflationary effects feared by Professor

Yeager. This is particularly true of the TVA, concerning which there has been, in my opinion, a tremendous lot of misunderstanding and misrepresentation. In view of the enormous rise in economic activities throughout the TVA region, mainly made possible through the availability of low-cost power (and related multipurpose developments presently referred to), the idea that the federal financing has had an inflationary effect at the expense of other parts of the country, seems palpably untenable.

FURTHERMORE, TVA has been in fact financially self-sustaining. It has provided for the cost of labor, management, materials used, depreciation, local and state taxes, and more than the government's required return on investment. There could be an argument on taxes, especially income taxes; but that, I think, is duly answered by the excess return paid to the government above interest cost, and by the character of TVA's financial structure. TVA's entire investment is represented by bonds and so, in any case, it would escape the reach of federal income taxes, provided its earnings would not exceed interest requirements. Any private company with a 100 per cent debt structure would also be free of income taxes under like circumstances.

Still, there are tax discrepancies between government and private financing, although that is not involved in Professor Yeager's analysis with respect to the alleged inflationary effect of federal financing. I merely submit that there can be no inflationary effect where, first, the government financing is in total directly self-sustaining, and, further, where it stimulates extensive follow-up enterprises and

RESULTS OF LOW-COST FEDERAL FINANCING OF HYDRO PROJECTS

so greatly raises the general economic level of the region served.

Professor Yeager clearly appears wrong in his logic that federal hydroelectric financing has been an inflationary factor in the total national economy and so has required the country at large to pay indirectly for the benefits of low-cost power obtained by favored electric consumers. Furthermore, he disregards the underlying fact that practically no important hydroelectric project could be independently planned and financed for maximum attainment of economic development in the region served or for the country at large.

ALMOST always the hydroelectric part is inseparably connected with, or dependent upon, other related purposes included in the over-all river valley development to which the federal financing jointly applies. The hydroelectric project is naturally an integral part of a multipurpose undertaking that depends not only for financing but also for development, and for total efficient management and operation, on the government.

In fact, the primary part of such a multipurpose governmental enterprise is

generally flood control, which is entirely beyond the reach of private development, financing, and operation. But, when flood control has once been planned on an adequate scale, electric power is an inseparable by-product, both in development and financing and subsequently in effective management and operation.

In most instances there are also other joint developments that induce area-wide economic expansion, but which could not be attained separately through independent private undertaking. They include variously navigation, irrigation, prevention of soil erosion, rebuilding of eroded lands, reforestation of land areas not suited to ordinary agriculture, institution of fisheries, wild-life preserves, recreational facilities, etc. They provide also for wide ranges of co-operation with other public bodies and private agencies for the development of enterprises, mostly private, that are created and fostered under the conditions brought about basically through the multipurpose development and government financing.

THE objective of the government-financed enterprises is to provide basic capital developments for general na-



Q "THE objective of the government-financed enterprises is to provide basic capital developments for general national welfare and progress that do not come within the framework and appeals of private capital. Such developments can be attained at all, or on adequate dimensions, only through outright public undertaking, including requisite financing. Their goal is not displacement of effective private enterprise with public, but rather to furnish the basic conditions or requisites for flourishing private (and other public) enterprises, and as a result to lift total production and to raise the general standards of living."

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tional welfare and progress that do not come within the framework and appeals of private capital. Such developments can be attained at all, or on adequate dimensions, only through outright public undertaking, including requisite financing. Their goal is not displacement of effective private enterprise with public, but rather to furnish the basic conditions or requisites for flourishing private (and other public) enterprises, and as a result to lift total production and to raise the general standards of living. The end result (as alleged in some quarters) is not creeping Socialism, but a better all-around national economy comprehensively integrated and co-ordinated between public and private sectors, and establishment of a stable and expanding over-all economy for the progressive welfare of all sections of the country.

This is not a matter of private enterprise doctrine *versus* doctrinaire Socialism, but rather of using good constructive sense nationally in planning for the future of the country. We should, it seems clear to me, provide for public developments and services where they fit best into the total economy, leaving to private business what fits its pattern for general progress (especially in the active competitive realms), and establishing suitable regulation in natural-monopoly industries which are privately organized but are not subject to such automatic public interest controls as prevail in competitive business.

Maintenance of a stable and expanding total national economy has been and, under modern technology, must be accepted as the outright, positive federal responsibility. This involves direct federal projects and related financing, and compre-

hensive co-ordination with the private and other public enterprises so as to prevent economic breakdown and to promote expansion for general welfare.

RETURNING to hydroelectric projects and their related multipurpose enterprises, I repeat that they simply cannot be developed and financed through ordinary private organization. Their attainment on an adequate and desirable scale depends inevitably on federal undertaking, but their planning and management should provide for close co-operation with states and other public bodies, and with private industry plans and production.

However, after comprehensive federal development has been carried through, it would be possible to transfer electric power, irrigation, and other parts of the total project to private organization and management on a financially self-sustaining basis, if that should be found in the public interest through greater attainable efficiency, as determined upon competent and unbiased inquiry.

But, if over-all efficiency appears with combined operation of the entire project, federal management could, and doubtless should, make each part of the total financially self-sustaining to the extent that appropriate charges can be fixed for directly benefited users of products and services. Otherwise, as with flood control, the costs cannot be practically assessed upon directly benefited individuals or groups, and must be borne by the federal government in the interest of the country at large.

Since flood control is of country-wide importance, the nation as a whole will benefit by comprehensive provisions as soon as they can be reasonably established.



National Policy for the Future

"DEVELOPING technology will be constantly raising new problems of relatively efficient economic organization in the fields of public and private enterprise and their effective integration for national welfare. Sensible determination of future economic policy for the nation must disregard ideologies of the right or the left. It must be determined through intelligent, unbiased, nation-minded inquiry. It should recognize, and provide for, the relative private and public parts as may be found to be in the public interest. This view may be hard to accept by those steeped in the private enterprise or socialist ideologies, but it is doubtless the view that will control more and more the course of national policy formulation in future."

I might add too that in the planning and financing of public projects, the prime consideration should be realizable public advantage, without too much concern to exact equitable cost allocation of benefits. Apart from projects that can readily be made financially self-sustaining, the others will roughly balance out over different sections of the country and groups of individuals; all will serve to expand production and to stabilize the over-all economy.

FRANKLY, I am for the welfare state, which, regardless of individual prepos-

sessions, is now the national objective. This, however, does not rule out continuous and great expansion of private enterprise in realms that conform to public interest criteria. Progressive general welfare, as attainable through modern private and public organization and co-ordination, should be, and doubtless will be, the national goal.

The chief obstacle to that goal will probably be the prevalent private enterprise ideology with which most of the nation's great industrial and business leaders are obsessed; it actuates also the leading

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industrial and business organizations and associations. With their fixed prepossessions, they tend to oppose any newly conceived and proposed public undertaking, regardless of its intrinsic merits for advancement of welfare.

Naturally, such intransigence arouses antagonism against private business even as to realms where it fits the welfare objective. Open-minded intelligence in research, planning, financing, organization, and management, is badly needed for progressive national advantage. This applies not only to hydroelectric power production but to all available economic developments and expanding production for the advancement of living conditions in all parts of the country.

Applying this broad concept comprehensively to the electric power field, I suggest open-minded consideration of the fact that not all parts of the country have close at hand highly economical hydroelectric projects, while, if attainable, all should have available low-cost power for regional development of industry, business, and ease of living. To bring about substantial equalization of power supplies and cost throughout the country, I suggest a federal program to interconnect all the great hydroelectric stations, supporting them systemwise with large efficient steam-electric stations, and thus making cheap main-load power available for distribution throughout the nation.

SUCH a comprehensive federal system will become especially advantageous as large atomic energy plants become economically feasible to replace base-load steam generation. In the atomic generating plants, as in hydroelectric plants, in-

terest requirements on large capital outlay will constitute the greater part of total output costs, so that federal financing will be highly advantageous. There will also be other advantages of comprehensive public organization and management, including the handling of dangerous materials in regard to radiation.

Developing technology will be constantly raising new problems of relatively efficient economic organization in the fields of public and private enterprise and their effective integration for national welfare. Sensible determination of future economic policy for the nation must disregard ideologies of the right or the left. It must be determined through intelligent, unbiased, nation-minded inquiry. It should recognize, and provide for, the relative private and public parts as may be found to be in the public interest. This view may be hard to accept by those steeped in the private enterprise or socialist ideologies, but it is doubtless the view that will control more and more the course of national policy formulation in future.

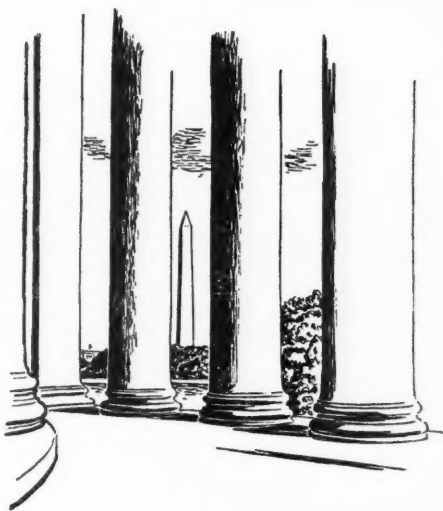
IN my opinion, private initiative and enterprise should be left as free and unfettered as practicable, but likewise public enterprise should be left available where it has general welfare advantages, and there should be continuous co-ordination between the two realms of activities as required for total economic expansion and stabilization. If this objective could be pursued actively, without obstruction or diversion by ideology-minded and special-interest groups, we could fast abolish poverty and bad living conditions throughout the country, and could stop fearing inflation and economic breakdown.

Washington and the Utilities

Progress on Niagara

LEGISLATION sponsored by New Yorkers in Congress for the development of additional hydroelectric power from the Niagara river has won administration approval. The Bureau of the Budget, after studying the various plans, concluded that the legislative program submitted by Senators Irving M. Ives and Jacob K. Javits, and Representative William E. Miller, all Republicans, "would be in the best interests of all concerned." The development would be in Representative Miller's up-state congressional district. Mr. Miller, who comes from Lockport, represents the Fortieth District, in which Niagara Falls is located.

The administration approval was of a compromise, reached after long controversy. It was marked by disagreements over highly technical problems concerning the river and its potentials. Many of the technicalities were raised over a deeper matter—public power development *versus* private investment and enterprise in that field. However, it appeared that public and private interests had met a general common ground in the Ives-Javits-Miller measures.



Initial congressional action is now up to the Committee on Public Works of the Senate and House of Representatives. Neither panel has set dates for hearings to start. However, such arrangements were expected soon. Early action was urged because serious losses in Niagara power had resulted from a rock slide last June 7th. It destroyed most of the Schoellkopf generating plant of the Niagara Mohawk Power Corporation at Niagara Falls.

"Since then," Senators Ives and Javits asserted in a joint statement, "defense plants of the area, largely electrochemical and electrometallurgical industries, have been receiving power at high cost, on a temporary basis, from the Ontario [Canada] Hydroelectric Commission."

THE compromise bills provide that Niagara Mohawk turn over rights to Niagara river water to the Power Authority of New York State. This is the agency that would build a new power project "with capacity to utilize all of the United States share of Niagara waters permitted by international agreement."

At this point, Senators Ives and Javits held, there has been a six-year delay in

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United States development of the additional power potential for New York state. Such a utilization through the six years, they contended, would have produced 13 billion kilowatts of electric power a year.

In short, the Ives-Javits Bill would provide that Niagara Mohawk Power Corporation turn over its rights to Niagara river water to the State Power Authority, which would build the project and then guarantee Niagara Mohawk a part of its output. The bill does not contain a federal type preference clause urged by government power proponents. They are expected to make at least one more effort in Congress to reinstate such a provision giving government power agencies an absolute priority to the Niagara power supply. The Ives-Javits Bill, however, is expected to enlist enough Democratic support to gain approval in both branches of Congress.

GOVERNOR Harriman's recent approval of a contract for sale of St. Lawrence river power to Niagara Mohawk Power Corporation ends one phase of the government *versus* private power controversy in New York state. The governor's action on St. Lawrence power was foreshadowed earlier by his announced intention of approving sales to Reynolds Metals Company. Under the terms of the contracts, Reynolds will receive 200,000 kilowatts of firm power and 39,000 kilowatts of interruptible power; Niagara Mohawk will receive 115,000 kilowatts of firm power and all residual power from the project not required by the New York State Power Authority's other customers. The agreement provides for the withdrawal of all the residual power at any time in the future, if necessary, to meet the needs of municipal plants and rural electric co-operatives.

MARCH 28, 1957

Kuykendall Explains

IN addition to the surprisingly forthright recommendations of the Federal Power Commission in its annual report (see page 476), Chairman Kuykendall made some interesting observations about his position on the subject of gas producer legislation to the House Commerce Committee. Chairman Kuykendall noted that he no longer favors exempting all producers of natural gas from federal regulation. As an alternative, he offered a 5-point program which was somewhat similar to the recommendations of the whole commission in its recent annual report.

Furthermore, Kuykendall's program seemed to be in accord with proposed legislation which is reported to have received tentative approval of various segments of the natural gas industry. Briefly, Kuykendall suggests that Congress pass a law which would: (1) permit the use of "fair field" or commodity value for pricing gas; (2) application of the "fair field" formula to both producers and pipeline companies; (3) elimination of the necessity of figuring producers' cost of service; (4) elimination of certain types of escalation clauses; and (5) elimination of the certification requirement for gas producers. Kuykendall told the House committee that if these recommendations were written into law some rates would have to be reduced, but others, he said, might be raised if the FPC found that they were too low.

Whatever the Senate may do about such legislation, any gas bill will be handled first by the newly appointed House Commerce Subcommittee on Transportation and Communication. In addition to gas and petroleum legislation, the subcommittee's jurisdiction will include transportation, civil aeronautics, power, communications, and inland waterways. Representative Harris (Democrat, Arkansas), chairman of the House Com-

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merce Committee, is also chairman of the subcommittee. Other members include: Wolverton (Republican, New Jersey), Hale (Republican, Maine), O'Hara (Republican, Minnesota), Roberts (Democrat, Alabama), Staggers (Democrat, West Virginia), Flynt (Democrat, Georgia), Rogers (Democrat, Texas), Friedel (Democrat, Maryland), Macdonald (Democrat, Massachusetts), Springer (Republican, Illinois), Younger (Republican, California), and Derounian (Republican, New York).

DURING Kuykendall's testimony, Representative Bennett (Republican, Michigan) made an interesting suggestion about the possibility of creating a "pipeline REA." Bennett, who represents the isolated upper Michigan peninsula, is concerned over the remote prospect that natural gas might be extended into that area by voluntary action of the pipeline companies. Kuykendall told him, however, that the FPC has no authority to require pipeline companies to extend their lines.

Bennett noted that rural areas not previously served with electric power have been able to get it by forming co-ops to borrow government funds and build supply lines. Bennett wondered whether a similar plan could not be worked out to help areas such as northern Michigan get access to natural gas. Although neither Bennett nor the committee was completely serious about the idea, Bennett said he might introduce legislation giving the FPC the authority to require gas service where feasible and where the supply is sufficient.

Fast Tax Certificates Ending

THE Office of Defense Mobilization's rapid tax amortization program, under which many gas and electric utility

companies obtained certificates for five-year tax amortization privileges on emergency plant construction, is rapidly drawing to its close. In a few months ODM will close or eliminate the few remaining expansion goals. Only two will remain open: (1) research and development laboratories for defense purposes; and (2) military and atomic production facilities. The ODM program has steadily dwindled since its peak activity in 1953 when about 120 industry expansion goals were open. An expansion goal for power facilities serving military and AEC needs was closed to consolidate this category with more general AEC and defense procurement goals. These two categories are so broadly defined that almost anything needed by AEC or Defense Department would be covered.

A clarifying amendment to the expansion goal for oil and gas pipelines and petroleum storage facilities was made by ODM late in February. Under the amended goal, rapid tax amortization may be granted to oil and gas pipelines used solely to supply military installations or AEC projects and to petroleum storage facilities erected solely for military use. It also covers strategically located pipelines and storage facilities.

Despite the prospect of early cessation of the fast tax depreciation program by the ODM, utilities will continue to be a target for the industry's critics. At the recent annual convention of the National Rural Electric Co-operative Association at Chicago, the principal speaker, Senator Douglas (Democrat, Illinois), accused the utilities of "sneaking in the back door" of the United States Treasury.

MR. DOUGLAS based his attack on private utilities on "the rapid tax amortization subsidy" granted them under federal law. The "subsidy," he said,

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amounted to "an estimated \$4.7 billion." And, he added, "the federal government has invested \$3 billion in the federal power program." He also called for a clearer national budget so that the public could distinguish between expenditures that are "gone forever" and those that are reimbursable.

He charged that "verbiage and accounting gymnastics contained in the budget are purposefully obscured so that even we, the Congress, cannot figure out precisely what is going on in the federal government."

REA Interest Rates

OFFICIALLY or unofficially, the REA has no present plans to push a proposal to boost interest rates on loans to electric and telephone co-operatives. Members of a House Agriculture subcommittee heard recent comments to this effect from REA Administrator Hamil. Hamil did not say flatly that he was opposed to an increase in interest rates, now fixed at 2 per cent. But his testimony before the committee left the impression that REA itself will not make an issue of the matter. Representative Hiestand (Republican, California) has introduced a bill that would require co-ops to pay an interest rate equal to the average rate of interest now paid by the government on its borrowings. According to President Eisenhower's recent budget analysis, this would mean a rate of 3½ per cent. Hiestand's bill would also assess co-ops a "loan-service fee" to cover administrative costs of the loans.

REA Administrator Hamil agreed to publish in REA's annual report the comparative figures on the cost of government and private company power purchased by REA co-ops. The demand for such information, which up to 1953 was always in-

cluded in the annual report, came from a House subcommittee on government information, headed by Representative Moss (Democrat, California). Moss said refusal to make the information available suggests that the comparisons might be unfavorable. Hamil replied that the comparative figures are misleading, but are nevertheless available to anyone who wants them.

Atomic Hearings

HEARINGS before the Joint Committee on Atomic Energy continued with testimony from representatives of industry and other interested groups. Much of the testimony from industry leaders dealt with the rising costs of reactor construction. The hearings disclosed that the estimated \$55 million cost of a nuclear power plant in Westchester county, New York, has been boosted to \$90 million and costs of another plant in Massachusetts have risen by a large margin from an original estimate of \$35 million. AEC itself admitted that the estimate of \$37.5 million for its Shippingport, Pennsylvania, plant had risen to approximately \$55 million.

The Democrats on the Joint Committee seized upon the disclosure as fresh evidence of the need for federal construction of large-scale reactors. Such a program is contemplated by the Gore Bill (S 151) as it passed the Senate last year. But a majority of AEC members supported AEC Chairman Strauss' stand that the government should concentrate on research and leave it to private enterprise to build large-scale reactors.

Federal atomic insurance legislation will be considered by the Joint Committee immediately after the conclusion of the statutory hearings on the state of the atom, according to Chairman Durham (Democrat, North Carolina).

Telephone and Telegraph



Utility Relocation Bills

BILLS that would shift the cost of relocation of telephone and other utility facilities on federal-aid highways from utility customers to the highway departments are before many state legislatures, a survey by the National Highway Users Conference shows. According to congressional testimony, this cost could approximate \$1.5 billion on the interstate system alone.

Bills in at least 13 states would require the state highway departments to reimburse utility owners for costs of relocation necessitated by highway improvement. These states are Arizona, Colorado, Idaho, Indiana, Iowa, Montana, Nebraska, New Mexico, New York, North Dakota, Utah, Vermont, and Washington. The bills would require reimbursement not only for the interstate system, but for all other federal-aid systems as well. However, they would not provide reimbursement for state highways not receiving federal aid.

A bill which would have made it mandatory that the state highway department pay for relocation of utility lines was vetoed by the governor of Wyoming. The governor said the bill would have a "disastrous economic effect" by depleting highway funds which would have to be

made up by higher taxes on highway users.

Massachusetts last year enacted legislation providing that the state may reimburse the owners of utilities for the cost of relocation of their facilities on any of the federal-aid systems. A Georgia bill, which has passed one house of the legislature, would grant authority to the state highway department to advance funds to political subdivisions to pay the cost of utility relocation if it cannot be financed from other sources. All such sums would have to be repaid within fifteen years.

A bill in Connecticut would require the state highway commission to reimburse utilities for relocation costs on trunk lines of controlled access design. On other trunk lines, the highway department would be required to bear one-half of the cost. The present Connecticut law provides for "equitable sharing" of costs between the highway department and the utilities.

A BILL in North Dakota, which has been indefinitely postponed, would have written into law the present practice of the state highway commission requiring utilities to relocate their facilities at their own expense. A bill requiring the commission to assume this expense has been introduced.

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The Federal Aid Highway Act of 1956 provided that whenever a state pays for utility relocation in accordance with state laws and regulations, federal funds may be used to reimburse the state in the same proportion as federal funds are expended on the project. The federal definition of "cost of relocation" is the entire amount paid by the utility less any increase in value of the new facility and any salvage value derived from the old facility.

Subscription TV

THE Federal Communications Commission has been directed to allow a large-scale trial run of pay-as-you-see television programs. The request came from the Senate Commerce Committee and is not binding on the FCC, unless Congress follows up with specific legislation. Up to now, the commission has shown little enthusiasm for subscription TV and has failed to act on petitions asking for a test. Such petitions have come from Zenith Radio Corporation and International Telemeter for the use of public TV channels to broadcast scrambled signals that only the set of a paying customer could unscramble.

The Commerce Committee report did not propose any particular plan for collecting subscriber fees. Coin-box attachments, punch cards, and unscrambled code signals have all been suggested. The report calls on the FCC to reach an early decision on the technical merits of these systems and the commission's legal powers in the matter. "If its conclusions on these points are favorable to subscription service," said the report, "we are of the opinion that since many of the subsidiary questions are in the realm of speculation, carefully controlled tests should be authorized to determine how subscription television will operate and what its effects

on sponsored television will be. In the light of the results of such tests, an informed final decision as to whether subscription service should be authorized generally could be reached."

Both the committee and the FCC will no doubt be watching closely the results of an experiment with subscription TV scheduled to start in June in Bartlesville, Oklahoma.

Ohio Strike Ends

THE strike of CIO Communications Workers of America that paralyzed telephone service in southeastern Ohio for seven months ended in late February after a 25-hour bargaining session between the union, management, and government mediators. Chief stumbling block to a settlement was the union's insistence on retaining the union shop clause in its new contract. Management of the Ohio Consolidated Telephone Company had notified the union prior to the ending of the old contract that the union shop arrangement was not satisfactory to the company.

The strike settlement provides for a maintenance of membership clause in lieu of the union shop provision. Under maintenance of membership workers who have previously joined the union or who join during the term of the contract must retain membership or be discharged. Such an agreement does not forbid the employment of nonunion men or require a non-member to join the union.

Other issues included classification of supervisory personnel and arbitration of grievances. Wages had not been in contention.

The strike was marked by cable cutting on a major scale. In all, more than 500 slashings were reported since the strike began, accompanied by reports of physical violence against company person-

TELEPHONE AND TELEGRAPH

nel and property. The union consistently denied responsibility for the violence and vandalism.

ACA Labeled Red Dominated

A REPORT of the Senate Internal Security Subcommittee charges that the American Communications Association in New York is a Communist-dominated union. The report called the situation "an inherent peril to national security" and urged legislation to deal with the problem.

The ACA is the certified bargaining agent for some 5,000 employees of the Western Union Telegraph Company and RCA Cables in the New York metropolitan area. The report said that although the overwhelming majority of the union's members are loyal and patriotic citizens, the fact that a Communist leadership controls the policy of the union presents an indisputable present danger. The report recommended congressional study of legislation necessary to protect private and government communications by telegraph, cable, telephone, and radio subversive activity.

REA Loan Changes

REA Administrator Hamil reported progress at the 15th annual meeting of the National Rural Electric Co-operative Association held in Chicago in early March. Hamil summed up the rural REA telephone program for his NRECA audience briefly as follows:

In the telephone program loans were made to provide modern dial service for 188,000 additional rural subscribers. One hundred more independent companies and co-operatives became REA borrowers. About 330 new dial ex-

changes were placed in service and 28,000 miles of line were constructed. The network of telephone lines now in service is nearly 90,000 miles. Telephone loans to date will benefit nearly 800,000 rural homes and installations.

Administrator Hamil also outlined proposed changes in equity and security requirements in making REA rural telephone loans at a contemporaneous meeting of the National Telephone Co-operative Association. Under the proposed changes, commercial telephone companies will be required to provide 10 per cent equity as appraised by REA and raise any new equity funds which may later be required prior to the advance of loan funds. REA would allow an advance on loans where at least 50 per cent of required new equity funds is raised. But where net worth is less than 10 per cent of assets, no payments of dividends or other distribution of net worth will be permitted while new and supplemental loan mortgages are outstanding.

It was pointed out that existing REA borrowers, who have raised 50 per cent or more of required equity funds, can obtain REA advances by accepting a supplemental mortgage restricting dividends and other managerial controls.

THE proposed new REA equity requirements are somewhat different with respect to nonprofit co-op borrowers. They will be required to have at least 70 per cent of their subscribers signed up on a 5-year basis or collect \$10 for each unsigned applicant for service. As in the case of commercial company borrowers, co-ops will have to accept mortgage controls where their net work sinks below 10 per cent of assets. No effective date has yet been set for putting the proposed changes into operation.



Financial News and Comment

By OWEN ELY

Proposed Changes in the Annual Statistical Report

FOR some months a program has been under way for revising the form of the annual statistical reports furnished by electric and gas utilities to the EEI, AGA, insurance companies, and investment analysts. About every five years the electric and gas companies initiate such a program to bring the standard, industry-wide statistical report forms in line with the changed needs of the analysts. Late in 1956 the EEI and AGA Statistical subcommittees solicited the recommendations of the public utility analysts in a large group of insurance companies and investment houses and then asked a smaller group of analysts to screen and evaluate the suggestions received.

The analysts' evaluating committee (Charles Tatham, chairman, and Marilyn Walsh, secretary) met on several occasions to review and pass upon the many recommendations sent in. It then presented a condensed list of proposed revisions at a meeting attended by the EEI and AGA task forces. Charles Tatham reports that the majority of the evaluating committee's proposals were looked upon favorably by the subcommittees. Through an interchange of ideas and views among the three groups they came up with specific recommendations to modi-

fy the annual statistical report form. These recommendations will now be submitted to the appropriate EEI and AGA Statistical committees for full discussion and final action. The following summary of the proposed changes may be of interest to utility executives and analysts:

THE largest number of requests submitted to the evaluation committee by thirty-one utility analysts were those relating to a utility's possible use of accelerated amortization and accelerated depreciation and the resulting effects on earnings. Since the two items are different in their long-term effects the analysts wanted them shown separately, in footnote D of the income account, which would thus include four items as reported to the U. S. Treasury Department: accelerated amortization, accelerated depreciation, other depreciation, depletion. The provi-

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Table—Data on Electric Utility Stocks	468, 469, 470

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sion for "deferred income taxes" now shown in the income account would be split to show separately the savings resulting from accelerated amortization and accelerated depreciation.

The analysts also urged that if federal income taxes are not "normalized" by inserting a special item for deferred taxes this should be made clear in the footnote, and it is understood that this recommendation is likely to be approved, since the effect on share earnings is becoming important. The suggestion that estimates of future tax deferments over a five-year period should be included was considered impracticable, although it is possible that inclusion of an estimate for one year ahead may be recommended. A corresponding breakdown of the balance sheet items "Reserved Income for Deferred Income Taxes" and "Reserve for Deferred Income Taxes" was also suggested and appears likely of acceptance.

The suggestion that page 1 should include the percentage of total revenues obtained from each state in which the company operates was well received, as well as the request for the square miles of the area served. (The latter is usually available in prospectuses and financial services.)

THE analysts also requested that the details of construction expenditures be extended to include estimates for the next two years (instead of one). There seem to be doubts whether some companies would be willing or able to show a breakdown for a second year into the future. However, it appears likely that many companies would be willing to furnish at least the *total* construction expenditures "now scheduled" for the second year ahead since it is quite customary in connection with new financing to issue estimates of the over-all amounts for sev-

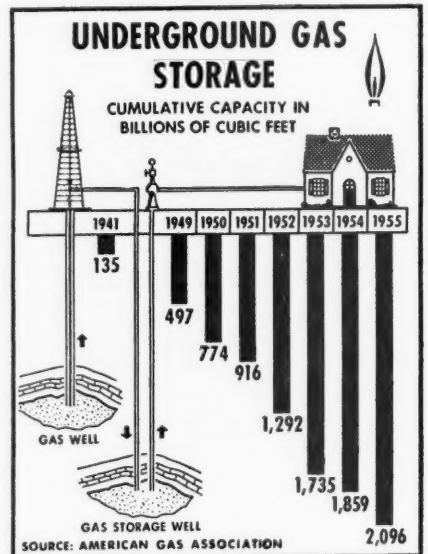
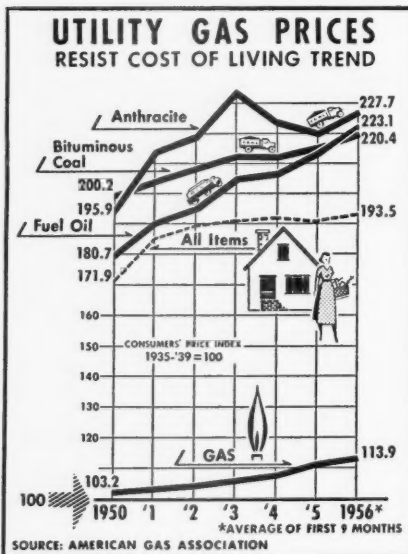
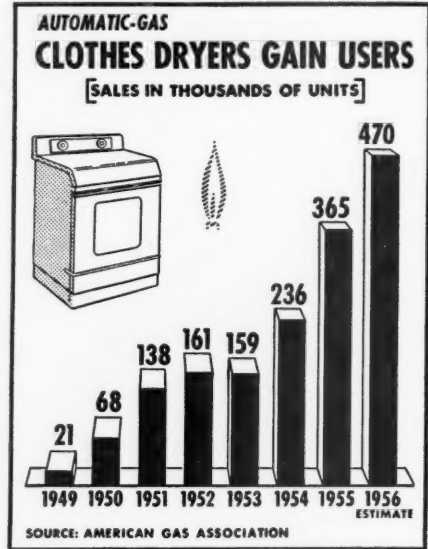
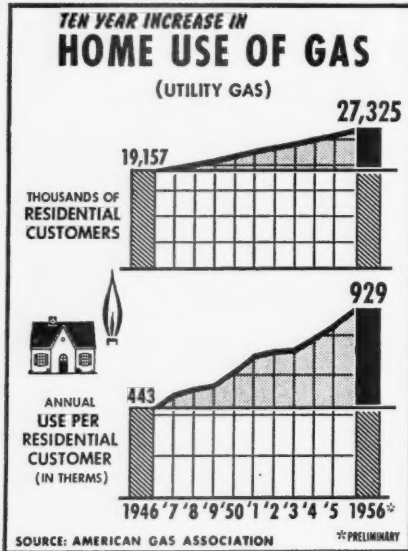
eral years in the future. To provide space for the added column cents could be dropped from the first column (lines 5-28, page 1) and estimates of future construction expenditures could be given to the nearest thousand dollars. The instructions might indicate that totals should be given if possible, even if details are not available.

The analysts' request for the amount of outside funds to be required to finance the future construction program was considered impracticable, since most companies' construction programs are subject to change and in addition they do not know just what the security markets will look like in the near future and hence have not determined what type of securities they will offer.

In the gas utility plant table on page 1, it was suggested that the item "Underground Storage" (line 17) be broken down to show both storage facilities and *cushion gas*; quantities (Mcf) of cushion gas, and usable gas in storage, were also requested. It seems likely that the addition of these data will be approved.

THE suggestion that the amount of "Interest on Mortgage Debt" be shown separately from interest on other long-term debt at line 19, page 2, was thought unnecessary. The analyst can calculate this figure from the table of capitalization in the latest prospectus though adjustments are necessary for new issues. However, the ratio "coverage of mortgage bond interest" seems to be used rather rarely; coverage of interest on all long-term debt, or of total fixed charges, is more apt to be used.

In the statistical section on page 3 it was suggested that the average number of customers as well as the year-end number might be shown. Another suggestion was that the ten largest industrial cus-



FINANCIAL NEWS AND COMMENT

tomers should be named, together with kilowatt-hour sales to, and revenues from, each of these companies. It appears likely that the revenue figures from each of the 10 largest *industrial groups* will be recommended. Inclusion of the kilowatt-hour and revenue figures for individual companies would reveal the average rate paid by each company, which might well be considered "classified information."

A number of changes were suggested in page 5 of the report where statistics on generating stations are given. It was suggested that instead of listing the stations and giving only the largest unit in each, the largest units on an over-all basis should be tabulated. At present data on some of the company's largest units may be omitted, except as reflected in the over-all station figures.

This change was opposed by the EEI group because it was believed that the size and installation date of the largest unit in a station are not too significant and it would be impractical to list all of the many generating units even if limited to those in the larger stations. It was felt that the new data to be added on Btu per kilowatt-hour for each major station would more than compensate for the deletion.

DATA on both summer and winter peak loads will probably be given in future, as recommended by the analysts, since many companies now have a maximum summer peak load due to air conditioning.

Also, an estimate of the peak load for the succeeding year may be added. In the table at the bottom of page 5 showing "New Stations or Additional Units under Construction," a column will probably be added to show costs.

In the table on page 6 covering fuel consumption, the analysts suggested that "Average Cost Per Million Btu" be sub-

stituted for the "Average Cost Per Unit" and it is understood that this change will probably go into effect. Perhaps the unit costs can be retained also, since changes in fuel costs are of special interest at this time and comparisons with previous years will be difficult if the present unit costs of coal, oil, and gas are dropped. At present the analysts can always figure out the cost per million Btu by dividing unit cost by average Btu content.

In the balance sheet on page 7 the average number (as well as year-end) common shares may be shown in future. A footnote is proposed explaining "other reserves" if the total amount is significant. For the benefit of insurance companies the amount of "bondable additions to plant" may be footnoted. A breakdown of line 32, "Current and Accrued Liabilities," is also proposed.

THE analysts' request for a cash flow statement apparently is not considered acceptable for the present, indicated objections being (1) it is difficult to provide details of future financing; (2) much of the data on past periods is already available by extraction from the income account and balance sheet; (3) there are many sources and dispositions to which funds can be put, and it is difficult to provide a useful schedule for everyone; and (4) competent analysts feel that they can analyze cash flow themselves.

To this we might add the comment that the main objective of projecting cash flow for future years would seem to be to determine (a) the amount of increase in the rate base, as a factor for future earnings, and (b) the amount and timing of future equity financing. The first can be obtained from projections of the construction program, the estimated retirements and depreciation accruals, while the second query is frequently answered directly by the utility company.

PUBLIC UTILITIES FORTNIGHTLY

FEBRUARY UTILITY FINANCING

PRINCIPAL PUBLIC OFFERINGS OF ELECTRIC AND GAS UTILITY SECURITIES

Date	Amount	Description	Price To Public	Underwriting Spread	Offering Yield	Aver. Yield For Securities of Similar Quality	Moody Rating	Success Of Offering
<i>Bonds and Debentures</i>								
2/6	\$12.0	Pub. Serv. of Okla. 1st 4½s 1987	99.25	.80C	4.29%	3.81%	Aa	a
2/14	30.0	Potomac Elec. Pr. Deb. 4½s 1982* ...	102.62	.81C	4.45	4.06	A	b
2/15	20.8	Trans-Canada Pipe Lines Units—5.60						
		Sub. Deb. 1987 and Common** ...	156.00	6.00	—	—	—	a
2/19	10.0	New England Pr. 1st 4½s 1987*	102.00	.79C	4.25	3.79	Aa	b
2/20	1.8	Central Elec. & Gas Conv. Sub. Deb. 4½s 1971	98.70	2.50	5.00	—	B	b-e
2/21	37.5	So. Calif. Ed. 1st 4½s 1982	100.00	.69C	4.25	3.79	Aa	a
2/27	5.0	So. Indiana G. & E. 1st 4½s 1987* ...	102.62	.82C	4.22	3.79	Aa	d
2/28	54.8	Cons. Ed. Conv. Deb. 4½s 1972	100.00	f-N	4.50	4.06	A	f
2/28	35.0	United Gas Corp. 1st 4½s 1977*	102.26	.70C	4.33	4.06	A	b
<i>Preferred Stock</i>								
2/27	15.0	Potomac Elec. \$2.44 Pfd. (Par \$50) .	50.00	.90N	4.88	4.37	—	a
<i>Common Stock—Offered to Stockholders</i>								
2/9	13.8	Dayton Power & Light	42.00	—	5.71	9.09%		g
2/14	15.3	Conn. Lt. & Pr.	16.50	—	6.67	7.81		h
2/27	6.1	So. Carolina E. & G.	18.25	N	6.03	8.26		i
2/27	12.9	West Penn Elec.	24.50	.18C	6.12	8.70		j
2/28	24.1	American Nat. Gas	54.40	.18C	4.77	8.26		k

*Cash sinking fund. **Units consisted of \$100 debenture and five common shares offered at \$156 (U. S.); \$54 million units were also offered in Canada. C—Competitive. N—Negotiated. a—Reported that the issue was well received. b—Reported that the issue was fairly well received. d—Reported that the issue sold slowly. e—The issue is convertible from November 1, 1957, to October 31, 1962, at 17½, to October 31, 1967, at 18½ and thereafter at 19½. f—The issue was offered to common stockholders on the basis of \$100 debentures for each 25 shares of stock. The debentures are convertible after June 1, 1957, at 45.45. The underwriters' commission is 50 cents on each \$100 debentures plus 25 cents on unsubscribed debentures. g—The issue was offered to stockholders on a 1-for-8 basis, with an oversubscription privilege, and was not underwritten. h—The issue was offered to stockholders on a 1-for-7 basis and was not underwritten. Soliciting dealers received 20 cents a share. i—The issue was offered to stockholders on a 1-for-10 basis with oversubscriptions. The underwriters' commission was 12 cents on all shares plus 15 cents or 30 cents on unsubscribed shares. j—The issue was offered to stockholders on a 1-for-16 basis. k—The issue was offered to stockholders on a 1-for-10 basis, with oversubscriptions.

SUMMARY OF UTILITY OFFERINGS IN FEBRUARY, 1957

	New Money	Not New Money
<i>Electric Companies</i>		
Bonds —Sold to Public	\$ 84,512,000	\$11,981,000
—Sold Privately	2,200,000	
—Offered to Stockholders ...	54,553,000	
Preferred —Sold to Public	14,730,000	
Common —Offered to Stockholders ...	48,042,000	
	\$204,037,000	\$11,981,000
<i>Gas Companies</i>		
Bonds —Sold to Public	\$ 66,796,000	
—Sold Privately	81,890,000	
Common —Offered to Stockholders ...	24,016,000	
	\$172,702,000	
Total Electric and Gas ..	\$376,739,000	\$11,981,000

Source, Irving Trust Company.

MARCH 28, 1957

FINANCIAL NEWS AND COMMENT

THE analysts' evaluation committee requested more detailed data with respect to gas reserves, to show the amount owned (including oil reserves), amount under contract, and other available reserves—together with the source of these data.

However, it is said that many utilities regard these details as confidential, and that the life insurance companies which hold substantial blocks of gas utility securities prefer the statements of independent geologists (usually reproduced in prospectuses) at periodic intervals, rather than company figures.

With regard to the "List of Gas Purchases" on page G-1, the analysts wanted data on contract expiration dates, which could be substituted for the column showing "point of receipt." Since each vendor may have many contracts with an individual pipeline or utility expiring at various times, this would present some difficulty, but perhaps the range of years covering expiration can be included.

"Gas Withdrawn from Storage" will probably be added in the table "Gas Production and Purchases," at line 10 on page G-1. The suggestion as to showing an estimate of maximum send out for the succeeding year involves an assumption as to the temperature on the coldest winter day, but some data on this may be worked out. A new setup was suggested for the table on page G-3, "Daily Gas Availability and Requirements" (evidently prepared in the days when manufactured gas was important), as follows:

Source	Maximum Day		
	Actual	Total Available	System Design (1)
Pipeline Purchases			
Withdrawn from Storage			
Peak-shaving Facilities			
Total			

(1) Based on assumed temperature

It appears likely that these data will be included in the revised form.

The analyst also requested a list of the ten largest gas industrial customers with term sales and revenues for each. To accomplish this the AGA subcommittee will recommend that page G-5 of the report, providing sales and revenue data by industry classification, be made available to analysts as well as to AGA. This page also shows data on sales of gas to electric utilities for use as boiler fuel, another point on which the analysts requested data.

The analysts also submitted the form of a detailed table showing "Seasonal Gas Sales by Type of Customer and Gas Service." This would give a breakdown of revenues and therms sold, by quarters, for the major sales classifications. The latter would be given in somewhat greater detail; for example, industrial sales would be broken down into "Firm and Off-peak" and "Interruptible."

This suggestion will be considered by the AGA subcommittee.

SEVERAL general recommendations seem likely to be adopted, such as numbering the various tables or schedules for easier reference, and loosening the format to some extent. It was recommended that an attempt be made to have utilities present data in their annual statistical report which will, "to the extent possible," be consistent with the data appearing in their stockholder report. This unquestionably would prove of immeasurable value to the security analyst as a time-saving device and would also tend to lessen the burden upon the reporting company in answering countless inquiries caused by inconsistent reporting practices.

Both the security analysts and the EEI and AGA Statistical subcommittees are to be commended for their efforts to bring forth an annual statistical report which will meet today's requirements.

PUBLIC UTILITIES FORTNIGHTLY

England Triples Atomic Reactor Program

GREAT BRITAIN has announced that it will spend £919 million (over \$2.5 billion at the official rate of exchange) on 19 nuclear power stations by 1965. The stations will have an electric-generating capacity of at least 6 million kilowatts. These figures compare with an original estimated expenditure of only £300 million for the construction of 12 nuclear power stations, as announced in the White Paper on Nuclear Power in 1955. The nuclear stations, when in operation, should produce one-quarter of the total electricity used in the United Kingdom.

The Proposed Split of American Telephone

THE question of splitting American Telephone 4 for 1—for many years

a source of periodic rumors in Wall Street—will be voted on at this year's annual meeting, to be held April 17th, since it was placed on the proxy form for the first time. In the letter to stockholders accompanying the proxy AT&T directors opposed the split, giving their views:

(1) A split is not needed to stimulate stockholder interest and secure new stockholders, since the company now has 1.5 million stockholders or nearly two-and-a-half times the number for any other corporation. The number of stockholders has more than doubled in the past decade. (2) A split has no statistical magic—it does not add anything to the basic value of the shares, increase the assets, or change net income. (3) Studies regarding stock splits by other companies, according to the directors, show "that unless there is a substantial dividend increase a stock split causes a speculative flurry in the stock."



DATA ON ELECTRIC UTILITY STOCKS

DATA ON ELECTRIC UTILITY STOCKS											
Annual Rev. (Mill.)		3/6/57 Price About	Dividend Rate	Approx. Yield	Recent Share Earnings	% Increase	Aver. Incr. In Sh. Earnings 1951-56	Price-Earnings Ratio	Div. Pay-out	Approx. Common Stock Equity	
\$268	S	American G. & E.	36	\$1.44m	4.0%	\$2.03De	5%	9%	17.7%	71%	34%
39	O	Arizona Pub. Serv.	24	1.12	4.7	1.74Oc	26	9	13.8	64	31
10	O	Arkansas Mo. Power	23	1.24c	5.4	1.95Se	18	8	11.8	64	30
32	S	Atlantic City Elec.	28	1.30	4.6	1.66Ja	7	10	16.9	78	33
132	S	Baltimore G. & E.	36	1.80	5.0	2.32De	13	8	15.5	78	45
6	O	Bangor Hydro-Elec.	33	1.90	5.8	2.59Se	23	3	12.7	73	31
5	O	Black Hills P. & L.	24	1.40	5.8	2.40Ja	10	1	10.0	58	27
99	S	Boston Edison	51	2.80	5.5	3.45De	1	2	14.8	81	50
19	A	Calif. Elec. Power	14	.76	5.4	.97De	7	12	14.4	78	35
17	O	Calif. Oreg. Power	32	1.60	5.0	2.22Au	10	4	14.4	72	37
7	O	Calif. Pac. Util.	29	1.50	5.2	2.32**De	5	6	12.6	65	29
63	S	Carolina P. & L.	25	1.10	4.4	1.64Ja	D5	2	15.2	67	37
28	S	Cent. Hudson G. & E.	16	.80	5.0	1.10De	10	10	14.4	73	34
21	O	Cent. Ill. E. & G.	31	1.60	5.2	2.35De	14	11	13.2	68	33
35	S	Cent. Ill. Light	56	2.60	4.6	3.81Ja	D2	8	14.8	68	42
50	S	Cent. Ill. P. S.	31	1.60	5.2	2.44Se	7	17	12.7	66	35
13	O	Cent. Louisiana Elec.	35	1.60	4.6	2.06De	13	8	17.0	78	32
33	O	Cent. Maine Power	22	1.40	6.4	1.71Ja	D3	7	13.0	82	33
128	S	Cent. & South West	37	1.60	4.3	2.32De	14	15	15.9	70	35
11	O	Cent. Vermont P. S.	17	1.00	5.9	1.19N	D9	2	14.3	84	28
114	S	Cincinnati G. & E.	28	1.20f	4.3	1.99De	5	7	14.0	60	43
6	O	Citizens Util. "B"	14	.90a	6.4a	1.11Se	2	11	12.6	81	40
104	S	Cleve. Elec. Illum.	39	1.60	4.1	2.60De	4	8	15.0	62	47
4	O	Colo. Cent. Power	26	1.20	4.6	1.84De	14	8	14.1	65	33
48	S	Columbus & S. O. E.	31	1.60	5.2	2.25De	3	5	13.8	71	36
360	S	Commonwealth Edison ...	42	2.00	4.8	2.72De	4	8	15.6	74	47
11	A	Community Pub. Serv.	25	1.20	4.8	1.82De	5	15	13.7	66	52
2	O	Concord Elec.	44	2.40	5.5	2.71**	3	2	16.2	89	61

FINANCIAL NEWS AND COMMENT

Annual Rev. (Mill.)	(Continued)	3/6/57 Price About	Divi- dend Rate	Approx. Yield	Recent Share Earnings	% In- crease	Aver. Incr. In. Sh. Earnings 1951-56	Price- Earnings Ratio	Div. Pay- out	Approx. Common Stock Equity
71	O Connecticut Lt. & Pr.	18	1.00	5.6	1.27Ja	11	7	14.2	79	39
23	O Connecticut Power	39	2.25	5.8	2.75De	D2	4	14.2	82	41
522	S Consol. Edison	45	2.40	5.3	3.20De	4	8	14.1	75	39
208	S Consumers Power	46	2.40	5.2	3.29Ja	5	6	14.0	73	43
74	S Dayton P. & L.	47	2.40	5.1	3.81De	13	8	12.4	63	38
34	S Delaware P. & L.	43	1.80	4.2	2.35Se	5	10	18.3	77	32
220	S Detroit Edison	40	2.00	5.0	2.36De	D3	8	16.9	85	42
130	A Duke Power	28	1.20	4.3	1.90De	5	20	14.7	63	52
95	S Duquesne Light	36	2.00	5.6	2.44De	4	4	14.8	82	34
31	O Eastern Util. Assoc.	34	2.20	6.5	2.58De	3	0	13.6	85	34
2	O Edison Sault Elec.	16	.80	5.0	1.13Se	4	24	14.2	71	40
12	O El Paso Elec.	42	2.00	4.8	2.73De	13	8	15.4	73	41
11	S Empire Dist. Elec.	21	1.20	5.7	1.59De	9	1	13.2	75	30
4	O Fitchburg G. & E.	50	3.00	6.0	3.52**	8	3	14.2	85	55
49	S Florida Power Corp.	51	1.80	3.5	2.86De	24	19	17.8	63	32
110	S Florida P. & L.	47	1.28	2.7	2.59De	26	16	18.1	49	40
189	S General Pub. Util.	36	1.90	5.3	3.05De	9	12	11.8	62	40
6	O Green Mt. Power	16	1.00	6.3	1.23De	—	7	13.0	81	36
56	S Gulf States Util.	37	1.60	4.3	2.21De	2	17	16.7	72	31
22	A Hartford E. L.	57	2.88	5.1	4.12De	D1	12	13.8	70	49
5	O Haverhill Elec.	40	2.35	5.9	2.62**	34	—	15.3	82	100
21	O Hawaiian Elec.	38	2.50g	6.6	3.45De	9	—	11.0	74	39
78	S Houston L. & P.	50	1.60k	3.2	2.81Ja	10	20	17.8	57	40
8	O Housatonic P. S.	21	1.50	7.1	1.41**	19	0	15.0	106	54
27	S Idaho Power	35	1.40	4.0	2.18De	16	7	16.1	64	36
82	S Illinois Power	59	3.00	5.1	4.00De	16	6	14.8	75	35
40	S Indianapolis P. & L.	30	1.50	5.0	2.07Se	8	2	14.5	72	38
19	S Interstate Power	14	.80	5.7	1.05Se	4	6	13.3	76	31
33	O Iowa Elec. L. & P.	29	1.50	5.2	2.25Ja	7	10	12.9	67	31
39	S Iowa-Ill. G. & E.	31	1.80	5.5	2.41De	4	3	12.9	75	41
37	S Iowa Power & Lt.	28	1.60	5.7	2.03De	—	2	13.8	79	35
30	O Iowa Pub. Serv.	16	.80	5.0	1.10De	9	3	14.4	72	33
13	O Iowa Southern Util.	22	1.28	5.8	1.83De	7	7	12.0	70	36
56	S Kansas City P. & L.	39	2.00	5.1	2.75Ja	7	8	14.2	73	35
30	S Kansas G. & E.	29	1.32	4.6	2.25Ja	15	9	12.9	59	26
45	S Kansas Pr. & Lt.	26	1.30	5.0	2.01De	16	9	12.9	65	31
37	O Kentucky Util.	26	1.28	4.9	2.13De	4	9	12.2	60	34
7	O Lake Superior D. P.	24	1.20	5.0	1.69Se	13	4	14.2	71	38
6	O Lawrence Electric	29	1.75	6.0	1.87**	34	D	15.5	94	62
17	S Long Island Ltg.	22	1.20	5.5	1.55Se	20	4	14.2	77	34
52	S Louisville G. & E.	28	1.10	3.9	1.88De	4	4	14.9	59	40
7	O Lowell Elec. Lt.	56	3.00	5.4	3.64**	19	D	15.4	82	59
9	O Lynn G. & E.	32	1.60	5.0	2.10De	3	8	15.2	76	77
8	O Madison G. & E.	46	1.80	4.0	4.04Jy	NC	10	11.4	45	47
4	A Maine Pub. Serv.	17	1.08	6.4	1.24De	2	3	13.7	87	33
5	O Michigan G. & E.	45	1.60b	6.6b	4.07Se	16	13	11.1	39	35
159	S Middle South Util.	33	1.60	4.8	2.20Ja	14	6	15.0	73	35
28	S Minnesota P. & L.	27	1.40	5.2	2.10Ja	—	6	12.9	67	36
2	O Miss. Valley P. S.	30	1.40j	4.7	2.10Ja	16	3	14.3	67	31
12	A Missouri Pub. Serv.	13	.72h	5.5	1.04De	14	20	12.5	69	29
6	O Missouri Util.	25	1.36	5.4	1.79De	2	3	14.0	76	32
37	S Montana Power	44	1.80	4.1	3.23De	7	5	13.6	56	36
130	S New England Elec.	17	1.00	5.9	1.24Se	2	0	13.7	81	33
40	O New England G. & E.	18	1.05	5.8	1.42Ja	1	5	12.7	74	40
45	O New Orleans P. S.	45	2.25	5.0	2.65Ja	—	0	17.0	85	38
2	O Newport Elec.	18	1.00	5.6	1.40Ja	16	4	12.9	71	30
83	S N. Y. State E. & G.	37	2.00	5.4	2.97Ja	3	8	12.5	67	39
244	S Niagara Mohawk Pr.	32	1.80	5.6	2.13De	D4	4	15.0	85	35
75	O Northern Ind. P. S.	37	1.92	5.2	2.86Se	4	6	12.9	67	33
118	S Nor. States Power	17	.90	5.3	1.21De	4	9	14.0	74	33
9	O Northwestern P. S.	17	1.00	5.9	1.38Oc	NC	4	12.3	72	25
129	S Ohio Edison	50	2.64	5.3	3.79De	7	9	13.2	70	38
48	S Oklahoma G. & E.	40	1.80	4.5	2.46Ja	3	10	16.3	73	30
15	O Otter Tail Pr.	28	1.60	5.7	2.15Ja	D1	9	13.0	74	36
443	S Pacific G. & E.	50	2.40	4.8	3.37De	NC	16	14.8	71	33

PUBLIC UTILITIES FORTNIGHTLY

Annual Rev. (Mil.)		(Continued)	3/6/57 Price About	Divi- dend Rate	Approx. Yield	Recent Share Earnings	% In- crease	Aver. Incr. In. Sh. Earnings 1951-56	Price- Earnings Ratio	Divi. Pay- out	Approx Common Stock Equity
44	O	Pacific P. & L.	31	1.60	5.2	1.98Oc	NC	4	15.7	81	28
123	S	Penn Power & L.	44	2.40	5.5	3.32De	11	9	13.3	72	29
210	S	Phila. Elec.	40	2.00	5.0	2.59De	8	5	15.4	77	40
32	O	Portland Gen. Elec.	25	1.20	4.8	1.69N	2	6	14.8	71	39
58	S	Potomac Elec. Pr.	22	1.10	5.0	1.50Se	16	7	14.7	73	40
77	S	Pub. Serv. of Colo.	45	1.80i	4.0	2.83Se	11	7	15.9	64	38
300	S	Pub. Serv. E. & G.	32	1.80	5.6	2.10De	D7	—	15.2	86	38
75	S	Pub. Serv. of Ind.	39	2.00	5.1	2.55Ja	8	4	15.3	78	36
26	O	Pub. Serv. of N. H.	16	1.00	6.3	1.30Ja	7	13	12.3	77	36
11	O	Pub. Serv. of N. M.	14	.68	4.9	1.12Se	18	4	12.5	61	33
25	S	Puget Sound P. & L.	27	1.36	5.0	1.67De	10	10	16.2	81	61
52	S	Rochester G. & E.	30	1.60	5.3	2.24De	12	8	13.4	71	36
17	O	Rockland L. & P.	18	.80	4.4	.97**	20	11	18.6	82	29
8	S	St. Joseph L. & P.	24	1.40	5.8	1.81De	7	7	13.3	77	40
51	S	San Diego G. & E.	23	.96	4.2	1.51De	23	6	15.2	64	40
8	O	Savannah E. P.	40	.84	4.2	1.36De	20	4	14.7	62	30
9	O	Sierra Pacific Pr.	21	1.20	5.7	1.88De	33	14	11.2	64	27
195	S	So. Calif. Edison	49	2.40	4.9	3.48De	5	3	14.1	69	37
43	S	So. Carolina E. & G.	21	1.10	5.2	1.51De	12	20	13.9	73	31
6	O	Southern Colo. Pr.	15	.70	4.7	1.29N	6	11	11.6	54	37
228	S	Southern Co.	22	1.10	5.0	1.54De	14	10	14.3	71	35
16	S	So. Indiana G. & E.	32	1.60	5.0	1.94Ja	D12	5	16.5	82	35
5	O	So. Nevada Power	17	1.00	5.9	1.39Se	D5	41	12.2	72	34
1	O	Southern Utah Power	16	1.00	6.3	1.42Oc	61	D	11.3	70	38
3	O	Southwestern E. S.	19	1.08	5.7	1.64N	—	4	11.6	66	27
39	S	Southwestern P. S.	28	1.40	5.0	1.79De	19	4	15.6	78	30
26	A	Tampa Elec.	29	1.20	4.1	1.65De	18	14	17.6	73	38
127	S	Texas Utilities	41	1.44	3.5	2.35De	14	13	17.4	61	38
40	S	Toledo Edison	13i	.70	5.2	1.01De	D8	5	13.4	69	29
12	O	Tucson G. E. L. & P.	31	1.40	4.5	2.02De	27	10	15.3	69	33
119	S	Union Elec. of Mo.	28	1.52	5.4	1.76Se	4	13	15.9	86	37
30	O	United Illuminating	26	1.30	5.0	1.61**	3	9	16.1	81	51
5	O	Upper Peninsula Pr.	29	1.60	5.5	2.02Se	D8	14	14.4	79	36
41	S	Utah Power & Lt.	26	1.10	4.2	1.70Ja	7	9	15.3	65	43
118	S	Virginia E. & P.	45	1.80	4.0	2.78De	10	13	16.2	65	34
26	S	Wash. Water Power	35	1.88	5.4	2.31Ja	9	14	15.2	81	44
127	S	West Penn Elec.	27	1.50	5.6	2.15De	4	10	12.6	70	29
64	O	West Penn Power	51	2.40	4.7	3.27De	1	13	15.6	73	33
11	O	Western Lt. & Tel.	33	2.00	6.1	3.03Se	13	7	10.9	66	31
26	O	Western Mass. Cos.	42	2.20	5.2	3.09De	—	12	13.6	71	56
95	S	Wisc. El. Pr. (Cons.)	32	1.60	5.0	2.44De	3	16	13.1	66	39
37	O	Wisconsin P. & L.	26	1.28	4.9	1.87De	9	4	13.9	68	35
34	S	Wisconsin P. S.	23	1.20	5.2	1.78Oc	5	7	12.9	67	35
Averages					5.1%			8%	14.2	73%	
Foreign Companies											
188	S	Amer. & Foreign Pr.	17	\$.80	4.7%	\$2.19Se	27%	2%	7.8%	37%	46%
139	A	Brazilian Trac.	10	.75n	7.5	1.18**	D7	D	8.5	64	72
63	A	British Columbia Pr.	45	1.20	2.7	2.05**	37	27	22.0	59	27
16	A	Gatineau Power	29	1.40	4.8	2.28De	10	15	12.7	61	30
31	O	Mexican L. & P.	15	—	—	1.80**	27	117	8.3	—	45
11	A	Quebec Power	27	1.20	4.4	1.73**	11	12	15.6	69	48
45	A	Shawinigan Wtr. & Pr.	87	1.80	2.1	3.48**	30	22	25.0	52	35

A—American Stock Exchange. B—Boston Exchange. O—Over-counter or out-of-town exchange. S—New York Stock Exchange. Ja—January; F—February; Ma—March; Ap—April; My—May; Je—June; Jy—July; Au—August; Se—September; Oc—October; N—November; De—December. *Based on average number of shares. **Calendar year 1955. a—Estimated annual rate. The "A" stock received stock dividends. b—Also 3 per cent stock dividend December 31, 1956, which is included in the yield. c—Also 2 per cent stock dividend January 10, 1956. f—Also 5 per cent stock dividend August 15, 1956. g—Cash dividends of \$2.50 in 1956 included 30 cents extra; 10 per cent stock dividend also paid April 30, 1956. h—Also stock dividend of one share for each 200 shares held September 12, 1956. i—Also 10 per cent stock dividend November 16, 1956. j—Also 10 per cent stock dividend August 31, 1956. k—Also 5 per cent stock dividend December 17, 1956. m—Also 2 per cent stock dividend January 10, 1956; 3-for-2 split June 15, 1956. n—Also 5 per cent stock dividend December 28, 1956.



What Others Think

Business and Scientific Education

It is hardly news that the serious shortage of scientific man power in the United States is causing grave concern among the nation's leaders. Soviet Russia reportedly has twice as many technical graduates, while our own colleges report an increasing reluctance among students to pursue a scientific education. There is abundant evidence to indicate that our high schools are failing to arouse young people's interest in science and encourage them to develop such learning at higher levels.

The problem has not escaped the attention of leaders of the American business community. The direct and very practical interest business has in this matter was recently brought out in an address by M. J. Rathbone, president of the Standard Oil Company of New Jersey, in acceptance of the Stevens Honor Award of the Stevens Institute of Technology. "Any shortage in scientific man power would almost certainly adversely affect present and future American business operations," Rathbone said. "If business and industry are to expand, as we know they must, there will be required more and more educated men and women; and since industry increasingly leans upon science and technology it is particularly concerned with these highly important fields."

Business and industry have this very

particular interest in education in the scientific and technological fields not only for the purpose of improving efficiency and profits, said Rathbone, but more largely because they carry such a heavy responsibility towards our society. To discharge this responsibility business must have more and better educated people to give leadership, direction, inventiveness, and understanding in our business world. Our colleges and universities are, of course, the source of such people. Said Rathbone:

By no means do I wish to give the impression that business and industry alone will give all of the leadership needed to our society and our economy. Obviously this is untrue. Much of it will come from our educational leaders themselves, from our professional men as individuals, from our politicians, from our religious leaders, and, hopefully, from our labor leaders. But I do believe all will agree that business and industry in our country are occupying an increasingly important place of leadership and responsibility. Furthermore the problems with which business must deal become constantly more complex. For these reasons, business has an increasing need for people with better training, broader capabilities, and wider

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vision. Almost every business can point to a successful executive who did not have advanced formal education, but such cases will become rarer as time goes on. In any event, such cases are exceptional, and the need is such that we cannot afford to count on exceptional cases to fill the need.

ONE way to conceive of the strong link between business and education is in terms of responsibility, Rathbone said. He believes business and industry generally recognize the responsibilities they face.

"I would say that hardly an important business organization fails to weigh these responsibilities carefully in connection with every significant decision it makes," he said. "The nineteenth century concept of making all the profit the traffic will bear, and the public—and the employee—be damned, has no place in modern management thinking. Brewster Jennings, chairman of the Socony Mobil Oil Company, in a speech recently advanced a suggestion which exemplifies this point. He said we should not talk so much today about 'the free enterprise system' but rather about 'the responsible enterprise system.'"

"Business today has a responsibility to its workers to provide them—as far as possible—with continuous employment, with a fair share of the proceeds of their work, with opportunity for self-improvement and advancement, and with time to enjoy other things in life besides their work.

"Business has a responsibility towards the communities in which it functions and which supply it both with a home and with its employees, to be a good 'corporate citizen' with the contribution of time, money, personal interest, and leadership which that term implies.

"Business has a responsibility towards

its customers to supply them with the things they want and need in adequate quantities, of satisfactory quality, and at as reasonable prices as possible. Customer responsibility for business is continuing and long range. It would hardly be responsible for instance to have our automobile companies suddenly decide they were going into another business after our whole country had developed a complete dependence on automotive transportation. Nor would it be responsible for our oil companies to exhaust our supply of petroleum without planning well ahead for substitute liquid energy to drive our automobiles. The same thing is true of every basic industry providing goods or services which become vital to our social or economic life.

"BUSINESS has a responsibility towards our government also—a responsibility to support it with reasonable taxes, to assist it by making goods and services available for our economy and our national security, and to give it advice and counsel and co-operation, either voluntarily or upon request. I might say that this responsibility is a two-way street, and on occasions we in business feel that government overlooks some of its responsibilities towards business.

"Business also has a responsibility towards our educational system, and this responsibility, as I have pointed out earlier, is really one in which business has a selfish interest, as it can only survive and progress with the help of more educated people. Research, which can show us in business how to do better the things we now know about, and can discover new things for business to do or to produce, requires educated people. Solving the complex social, political, and human relations problems which business management faces today also requires educated people.

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It is estimated that over 90 per cent of the executives in American industry are college trained. Can there be any doubt that business needs more educated people?"

TURNING to the field of education, Rathbone gave his view of how industry feels educators are fulfilling their responsibilities.

"I think it is fair to say," he said, "that business believes the most critical shortage in scientific man power falls more in the area of the well-qualified graduate rather than being simply a matter of volume. The challenge is to provide more men who are able to continue to learn beyond their formal education—who are able to use reason, judgment, and imagination in their professional work. The more graduates of this caliber that our scientific schools can produce, the less we will have to worry about America's future, particularly where competition from Soviet science is involved. To put it in the terms of business, it is a case of a superior product far outweighing in value any numerical lead of a competitor who is turning out inferior goods." He continued:

Those of us who work in industry are gratified to know that educators in the sciences are thinking in a similar vein. It is encouraging to see that courses are designed, or are being modified, so they will best develop engineers and scientists who have a broad grasp of fundamentals instead of proficiency in one or two specialized fields. The stress being placed in college upon the science of mathematics, for example, will be of tremendous help to graduates when they enter industry. Problems in almost all industrial areas today require a very good grasp of this subject to permit their solution. A good mathematical background is also essential in order to make full use of modern elec-

tronic calculating tools and techniques which open whole new areas of exploration for the scientist. Also, the fact that the curricula of students in science and engineering increasingly include subjects that, as one noted institution puts it, "will lead to a broader understanding of the economic and humanistic aspects of the society in which the student aspires to gain professional and civic leadership," is comforting. For the engineer must understand and appreciate society as a whole in order to have his work useful in the highest degree.

To develop knowledge on this subject two companies affiliated with Rathbone's company, Jersey Standard, recently made a study which throws some light on the question of what industry needs in engineering graduates. The affiliated companies employ about 2,500 engineers between the two of them. The investigation was conducted among groups of recent engineering graduates and also among older engineers who had long industrial experience and in many cases administrative responsibilities. It was designed to find out if these professionals felt their college training had adequately fitted them for their careers and, also, how undergraduate courses might be modified for even better industrial preparation. The engineers questioned represented a total of 51 colleges and universities.

The findings were indeed interesting. Said Rathbone:

... We discovered, for example, that both the recent and the older graduates agreed that their present work demanded a larger amount of such qualities as logic and judgment, than it did the application of specific scientific subjects they had studied. In other words, too much specialization was not useful to them. Of particular interest was the

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fact that those questioned mentioned that a good part of their working time was spent in the field of communication—in speaking and writing effectively. Several made the point that an engineer in industry—no matter how good his training and how excellent his work—was not able to make much contribution to an organization if he was inarticulate on paper or in discussions with his colleagues.

There was evidence, too, of the fact that engineers in industry need less development in school of mechanical skills such as drafting, testing, and machine work, and more of those studies which strengthen reasoning powers and judgment. Modern industry provides a full line of mechanical aids and specialized services for its engineers and is using increasing numbers of technicians either "home trained" or from the two-year technical institutes for this purpose. Industry is also providing the kinds of environment which continue to stimulate the growth of creativity after formal education ends. But developing these powers cannot begin too early in an engineer's education. Many of those questioned, for example, said that a wider use of open-book examinations, in which the student is required to choose the salient points out of a mass of data, would have been very helpful in preparing them for industrial posts. More problems that challenge the student's judgment and knowledge of principles, rather than his memory, are desirable.

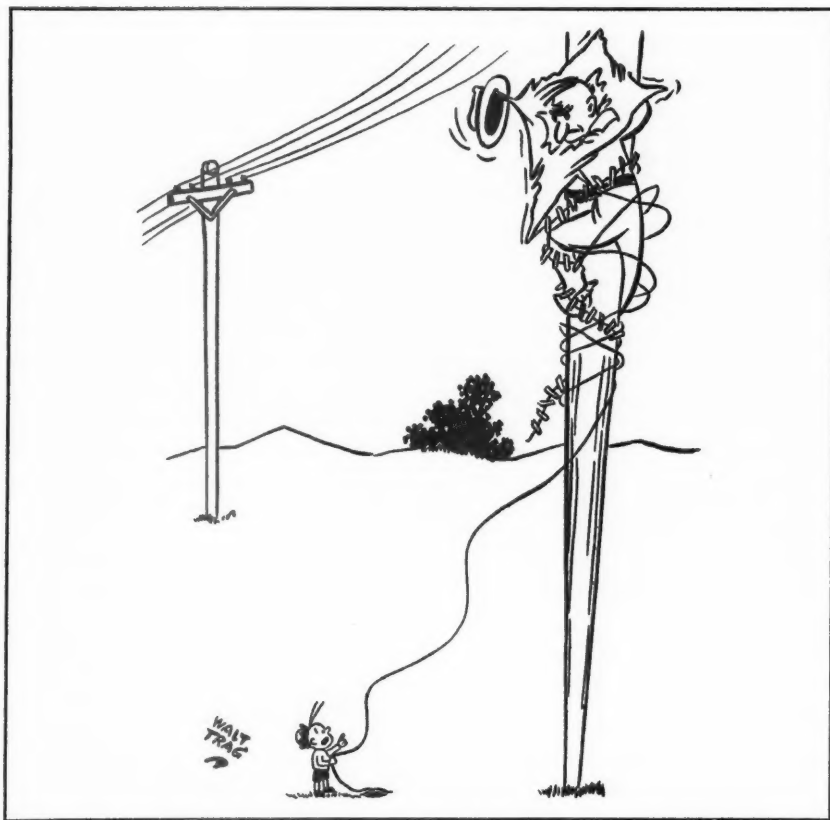
THE specific findings from the survey by Jersey Standard affiliates are, of course, from a relatively small group of engineers working for only two companies in a particular industry. But Rathbone believes they have considerable significance

as an indication of the sorts of measures which are needed if the educational world is to meet its responsibility to supply industry with technical graduates of the greatest usefulness.

There were one or two other things which were not covered in this particular survey. One has to do with the broadening of the technical graduate by requiring him to take some courses in the humanities and social sciences as a requirement for his scientific degree. Some colleges are doing this now, but Rathbone thinks it should be more widely applied. "Even at the cost of adding another year for a scientific degree I feel it is most important that our technical graduate should have a more liberal education so as to be able to understand his environment better, and be able to take into better account the social, economic, and political aspects and implications of his professional work," he said. "The greater the impact of science and technology upon our society the greater is the need for broader horizons for our technical people, and this is most particularly essential if the technical graduate ends up—as so many do—in administrative and executive work in the business world."

WITH the growing complexity of modern industry it is obviously difficult for today's engineering graduate to be trained in each field—or indeed to be fully trained in all phases of even one field of industry, Rathbone continued. As a matter of fact, he said, technological progress is now going on at such a rapid pace that most industries much prefer to train their engineers in their own specialized fields after employment. What is needed in the technical field is very thorough education and training in the basic sciences which will allow a man to be more rapidly and thoroughly developed in the specialized

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"WILL YA GET MY KITE, PLEASE, MISTER?"

areas he will encounter after employment in the industry of his choice.

Finally, with regard to technical graduates, Rathbone notices a rather wide gap in many graduating classes between the top and bottom with respect to intellectual maturity or mental discipline. Conceding that there are wide differences in the mentality of people, and that it is only natural to expect that these differences would exist *after* a college education as well as *before*, it nevertheless appears to Rathbone that college education should tend to bring these differences somewhat closer towards a common denominator than

seems to be the case in many graduating classes. He suggests that college entrance requirements should include more appraisal of the ability of the individual to reach a higher level of intellectual maturity; or that special teaching techniques are needed for certain individuals; or possibly that somewhat stricter standards for graduation are required.

"As we look down the road towards the future in our country we can see a big job ahead," Rathbone concluded, "I think it is fair to say no country in the world's history has ever come so far

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and done so much in 180 years. Basically, of course, this has been the result of our social, political, and economic systems which have given us the freedoms of thought and expression, the lack of class distinction, the equality of opportunity, and the rewards of personal industry, which have all combined to bring out the maximum efforts and results from each individual. A simple term for the whole result is 'high productivity.' With our national resources of incentive, intelligence, and raw materials we have been able to produce more per capita than any other nation.

"The result has been the highest standard of living for our people, the greatest industrial production, and the strongest financial resources, of any nation in the world. The potential for future progress is by no means less. Indeed many thought-

ful people feel that our past progress and our present state of welfare will look relatively small one hundred years from now.

"The job ahead is to keep our nation's productivity high."

PRODUCTIVITY, he pointed out, is of course the end result of four factors working together effectively: labor, management, capital, and technology. No one or two can produce alone—all four are needed. And a reasonable balance between all four factors must be achieved constantly. To maintain this balance in our complex world today requires more knowledge, more understanding, more creativeness, and more objective thinking on the part of more people. Education should lead towards this result, and the broadly trained scientific college graduate is certainly one of the key figures in the picture.

FPC Legislative Recommendations

THE thirty-sixth annual report of the Federal Power Commission contains a number of recommendations to the committees of Congress and the Bureau of the Budget for amendments to both the Federal Power Act and the Natural Gas Act. Suggested amendments to the Natural Gas Act are numerous and include the commission's views on legislation involving regulation of natural gas producers in the event of a failure by Congress to exempt the producers altogether from federal regulation. The FPC's recommendations on this score are:

. . . (1) elimination of any requirement for certificates of public convenience and necessity for producers of natural gas; (2) a standard for pricing or evaluating natural gas as a commodity which would not require use of a rate base or traditional utility rate-making principles . . . ; (3) elimination of any

mandatory requirement for determining and considering costs of or revenues from other products sometimes obtained in conjunction with the production of natural gas, including oil and liquid hydrocarbons; (4) the same treatment of independent producers and pipeline producers with respect to pricing or evaluating natural gas; (5) elimination of clauses in independent producers' contracts of sale to interstate gas transmission companies which contain provisions for a change of price to the purchaser by reason of (a) changes in the price received by the purchaser on resale, or (b) the payment or offer of payment of different prices by the purchaser or other purchasers to the seller or to other sellers.

SUMMARIZING the difficulties the FPC has encountered in determining just

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and reasonable rates for independent producers, the commission said it is endeavoring to decide the issues involved as expeditiously as possible. The report states:

... As to the methods and standards to be used in making such decisions, the commission is proceeding on a case-by-case basis, deciding each matter on the evidence and facts presented in formal hearing. Inasmuch as the regulation of independent producer rates is a new and vastly complicated undertaking, it is felt that any predetermined standards arbitrarily fixed at this time would, in all probability, require substantial revision at a later date, thereby leading to confusion and instability. Thus the standards and techniques to be used in the solution of the many problems will be evolved as the commission processes and completes the pending and any future cases. . . .

The commission noted that up to June 30, 1956, rate increases requested by independent producers had been allowed in only three cases. In each of those cases, the applicants introduced evidence regarding costs as well as field price data and arm's-length dealings. FPC orders, the report stated, have repeatedly stated that evidence of field prices and arm's-length bargaining, alone, does not sustain the statutory burden of proof placed upon the applicant in a suspension proceeding.

OTHER FPC legislative recommendations for amendments to the Natural Gas Act, some of which are intended to be applicable only to interstate pipeline companies, are:

(1) Amendment of § 12 to give the FPC jurisdiction with respect to approval of security issues of natural gas companies.

(2) An addition to § 7 permitting the

commission to require natural gas companies to interconnect their facilities with others engaged in the sale and distribution of natural gas and to sell or exchange gas with such persons, together with the authority to prescribe the terms, arrangements, and conditions for such interconnections and the compensation payable therefor.

(3) An addition to § 7 permitting voluntary interconnections of natural gas facilities and their maintenance on a permanent basis for emergency use upon authorization by the commission, and, under such circumstances, conferring a jurisdictional exemption.

(4) Amendment of § 14 (a) so as to give the commission broad investigatory powers with respect to the gas industry similar to those now conferred upon it with respect to the electric industry by § 311 of the Federal Power Act.

(5) Inclusion of foreign commerce within the coverage of the act, defining persons engaged in the importation or exportation of natural gas as "natural gas companies" so far as their operations in the United States are concerned.

(6) Granting the commission full authority to suspend rate schedules covering sales of natural gas for resale for industrial use only.

(7) Express authorization for the commission to increase rates where necessary to correct undue discrimination, and to allocate gas among customers of a natural gas company in periods of shortage.

(8) Amendment of § 7 (c) of the act to eliminate the mandatory hearing requirement, substituting a requirement for due notice and opportunity for hearing; to provide specifically for control by the commission of the allocation of natural gas when required for national defense or to safeguard the available supply in emergency situations; to require by ex-

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press language a certificate when the person merely constructing the facilities will not become a natural gas company, as, for instance, the certification of interstate facilities for lease or sale to another as operator; and to enlarge the commission's authority to grant temporary certificates of convenience and necessity in any emergency situation where no objection to issuance has been filed after due notice has been given.

(9) Amendment of § 7 (b) to eliminate the mandatory requirements for hearing, substituting a requirement of due notice and opportunity for hearing; and to make it clear that the section applies to service and to curtailment as well as abandonment of service.

(10) Amendment of § 7 (b) to require commission approval for the transfer by a natural gas pipeline company of natural gas reserves where such reserves have constituted part of the bases for issuance of certificates of public convenience and necessity.

(11) Amendment of § 7 (f) to eliminate the service area provision and to provide for the enlargement of existing facilities to serve present customers under such rules and conditions as the commission may prescribe.

(12) Amendment of § 7 of the act to authorize the commission to prescribe safety regulations with respect to the operation of interstate natural gas pipelines.

IN addition, the FPC recommended that the rate-changing procedures of § 4 of

the Natural Gas Act and § 205 of the Federal Power Act be made available to companies seeking to change a filed contract rate where the purchaser has not agreed to the change.

RECOMMENDATIONS for changes in the Federal Power Act included the following: (1) raising the limitation for exemption of small hydroelectric projects from the licensing provisions of the act to 2,000 horsepower; (2) requirement of commission approval of the abandonment or curtailment of interstate electric facilities or service; (3) amendment of § 10 (f) of the act to require not only reimbursement by nonfederal power developers for benefits accruing to them from upstream facilities constructed by another but also to require reimbursement by the federal government for improvements constructed by nonfederal interests; (4) amendment of § 202 to authorize the commission to compel the interconnection and co-ordination of electric power facilities duly found appropriate or necessary in the public interest; (5) amendment of § 15 of the act in accordance with a proposal made by Chairman H. Lester Hooker of the state corporation commission of Virginia so as to give a licensee of a hydroelectric development the first option to renew its license pursuant to the then prevailing statute and conditions prescribed by the commission in the event the United States, upon the expiration of the original license, did not exercise its option to take over the project as provided in § 14 of the act.

State of the Atomic Energy Industry

STATUTORY hearings held this month before the congressional Joint Committee on Atomic Energy brought forth a comprehensive statement from the Edison Electric Institute on the present status

of the atomic energy industry. Speaking for EEI was Elmer L. Lindseth, vice chairman of the EEI Committee on Atomic Power and a past president of the institute. Lindseth's statement was au-

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thorized by the EEI committee, which comprises fourteen member company executives.

Lindseth reported substantial progress in 1956 in the development of nuclear power. He noted, first, that at the time of EEI's last presentation before the Joint Committee, 44 electric power companies and associated service organizations had announced plans for development and construction of nine nuclear power plants, ranging in size from 3,000 to 236,000 kilowatts of capacity. Their participation, said Lindseth, was in one of three ways: Two projects were going forward under the AEC 5-year Reactor Development Program, two under the Power Demonstration Reactor Program, and five for development on a straight license basis. Since last May and up to the time of Lindseth's testimony before the Joint Committee, three additional companies or groups of companies had announced plans for the development and construction of nuclear power plants.

In October, Lindseth noted, Carolinas Virginia Nuclear Power Associates, Inc., consisting of four utilities in the area, announced its intention to construct a nuclear power plant or plants. In December, the New England Electric System, which is a sponsor of the Yankee Atomic Electric Company as well as Atomic Power Development Associates, Inc., announced plans to construct a 200,000-kilowatt (electric) nuclear power plant in its service area, with completion scheduled in 1964.

EARLIER this month a group of utilities in Minnesota, Wisconsin, Missouri, North and South Dakota, and Iowa announced that it is undertaking a nuclear power plant with electric capacity of 60,000 kilowatts on the system of Northern States Power Company. More recently,

Lindseth continued, two other companies or groups of companies have indicated their intention to proceed with reactor projects. An Ohio valley group, consisting of 12 companies, announced that it intends to submit a proposal for the comprehensive development of an advanced reactor concept, including the construction of a prototype reactor with a heat output of 50,000 kilowatts. Pacific Gas and Electric Company announced that it intends, either alone or in partnership with other California investor-owned electric utility companies, to submit a proposal under the AEC third-round invitation involving a large-scale advance type pressurized water or boiling water reactor electric power plant.

These five undertakings announced in recent months bring to 14 the number of reactor projects in which electric power companies are participating. These projects, in which 69 companies are participating, are expected to have an electric capacity in excess of 1.5 million kilowatts and involve expenditures of over \$400 million of investor funds.

Seven of these are either under construction or in the immediate preconstruction phase, while seven are in various stages of planning.

In addition, Middle South Utilities, Inc., and its four operating subsidiaries—Arkansas Power & Light Company, Louisiana Power & Light Company, Mississippi Power & Light Company, and New Orleans Public Service Inc.—have informed the AEC that they are conducting investigations of the feasibility of constructing a nuclear plant in their service area.

"IN selecting reactors for development and construction," Lindseth stated, "the electric power companies or groups of companies continue to be guided by the very basic consideration that development

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and construction of the reactor selected should make a significant contribution toward the ultimate achievement of commercial utilization of nuclear power. It is the opinion of the individual companies that commercial utilization of nuclear power best can be achieved through development and construction at this time of a number of different reactor types and variations. This is because of the belief that it is not possible to make a determination now as to which reactor type or types ultimately will prove most advantageous for commercial use. Therefore, the present broad program entails the development of a number of different basic reactor types, plus variations and improvements of certain of those types."

At present, Lindseth continued, large-scale demonstration projects are under construction or in an advanced stage of planning for four of the reactor types that were included in the AEC's original five-year program; namely, the pressurized water reactor, the boiling water reactor, the sodium-graphite reactor, and the fast-breeder reactor.

In announcing its third-round Power Demonstration Reactor Program, he said, the AEC stated that progress in the technology of two other types of reactors is such that construction of additional large-scale demonstration projects of those types presently is warranted and desirable.

These are the natural-uranium heavy water-moderated reactor and the fluid-fuel reactor system. An aqueous homogeneous reactor of the latter type has been the subject of a joint research and development project since July, 1955, by Pennsylvania Power & Light Company and Westinghouse Electric Corporation, and is being studied for a large-scale demonstration.

A NATURAL uranium heavy water-moderated reactor in large size is being studied as to feasibility by the Florida Nuclear Power Group, and a heavy water-moderated reactor which either would use natural-uranium fuel or would be a prototype for a large-scale natural-uranium reactor, among other reactor types, is being studied by Middle South Utilities, Inc. Lindseth told the committee:

These developments are mentioned in order to emphasize that power companies are making every effort to respond to the AEC's invitation for nuclear power plant proposals.

Power companies also are cognizant of that part of the AEC's third-round announcement that invites proposals for other types of reactors, including those that represent variations of designs for currently active projects. We feel that our broad goal—namely, that each undertaking make a significant contribution toward achievement of ultimate commercial utilization of nuclear power—can best be met through development and construction both of variations of types already being developed and more advanced types not yet undertaken.

It may be desirable to develop and construct small-scale reactors of promising types without turbine generator facilities, at least initially. Omitting the turbine generator facilities from prototype projects of most reactor types does not in any sense impair the technical contributions which can be derived from design, construction, and operation of such reactor types. Substantial advances in reactor technology already have been made through construction and operation of experimental power reactors, with no electric output, by the AEC.

Lindseth said a number of companies

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"THESE INSULATORS ARE NOT PART OF YOUR DÉCOR"

in the electric industry are studying advanced designs of nuclear power reactors. It is expected that these activities will expand. Three organizations whose research and development work exemplifies the industry's activity in this field are Atomic Power Development Associates, Inc., which is supported by 33 electric power companies and 12 other business organizations, Nuclear Power Group supported by seven electric power companies and one other business organization, and the recently formed Ohio Valley Group made up of 12 companies.

IN September of last year the Edison Electric Institute organized a Technical Appraisal Task Force on Nuclear Power. Inasmuch as the task force is submitting a statement to the Joint Committee for incorporation in the record of these hearings, it is not necessary to reiterate here its membership or purposes. Electric power companies expect to look to this task force, as well as to the AEC and others, for future guidance in carrying out their respective programs of nuclear power development. The technical reports of the task force will be made

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available to the Joint Committee, the AEC, and others interested in the furthering of nuclear power development.

Lindseth emphasized again the need for legislation to provide governmental indemnity with respect to nuclear power plants in addition to such indemnity insurance as now appears to be available commercially.

The Atomic Energy Act of 1954 contains a preference clause governing the disposal of by-product energy produced by facilities owned by the United States. Lindseth told the Joint Committee that the Edison Electric Institute favors amendment of the 1954 act so as to provide a nondiscriminatory means for disposal of electric energy to take the place of that now prescribed by § 44. The insti-

tute, he added, also advocates deletion of the preference clause relating to license applications as contained in the last sentence of § 182 (C) of the act.

"IN summary," Lindseth concluded, "the past year was one of continued progress and significant expansion of our industry's program of nuclear power development. Present plans of electric power companies, both in construction of nuclear power plants and in study of advanced reactor concepts, comprise a comprehensive program. As additional opportunities or needs develop we expect that necessary further steps will be taken by our industry, with emphasis on advancing the technology and economics of nuclear power applications."

Notes on Recent Publications

DIRECTORY OF CONSULTANT MEMBERS.

Consultants are playing increasingly important rôles in industry today. However, using a consultant to full effectiveness depends—in large measure—on *selecting* him wisely. A thorough, systematic listing of consulting organizations is urgently needed.

As an initial effort in this direction, the information service of the American Management Association has compiled a directory of 427 consulting organizations that are members of the association. Organizations are listed alphabetically, with a brief description of each firm's specialty. No endorsement is implied, since the association was not in a position to evaluate the proficiency of the various organizations.

A useful article by Robert F. Dick, vice president of the Illinois Tool Works, precedes this listing. Mr. Dick discusses the following subjects: determining the need for a consultant, the criteria for selection, the indoctrination period, reporting and implementing findings and recommendations, and what *not* to expect from a consulting organization.

To increase this publication's value, a listing by field of consultancy is also given. Published by the American Management Association, 1515 Broadway, New York 36, New York. 63 pages. Price, \$2 (AMA members, \$1).

IMPROVING THE CALIBER OF MANAGEMENT.

Although standards of performance have been set for many industrial positions, it has always been difficult to evaluate *executive* performance with any real precision. However, the important rôle of the executive almost requires that steps be taken to establish value judgments of his performance.

In this new AMA publication, William C. Truehaft, president of the Tremco Manufacturing Company, shows how his company is setting formal standards of performance for *all* managers—from top executives to first-line supervisors. He indicates that the result of the Tremco plan has been increased understanding by the executive of his functions and responsibilities.

In another paper, Robert H. Bridges, advertising manager of the Cleveland

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Electric Illuminating Company, describes how his company has made intelligent planning an important part of the executive function. He shows how the organization of planning projects by a central executive committee can offset many of the problems incurred by rising costs and rapid technological changes.

Other papers discuss the return-on-investment concept as a tool for decision making, how to develop the managerial skills of technical specialists, and how to build an operations research team. Published by the American Management Association, 1515 Broadway, New York 36, New York. 70 pages. Price, \$1.75 (AMA members, \$1).

CHANGING PATTERNS AND CONCEPTS IN MANAGEMENT. Management methods have been changing rapidly. A re-evaluation of current methods is essential to insure management's future development. For example, management has learned that motivational forces influencing human behavior are vitally important to efficient business operations. The creative manager can contribute significantly to the success of his organization by being aware of these forces and their implications. By linking this knowledge with traditional management concepts, he can insure effective performance at all levels.

To clarify these new trends in management thinking, this AMA publication presents a useful theory of management based on the *integration of motivation research with existing theories of scientific management*. Insights obtained from research in leadership, performance goals, and other motivational factors are applied to all company functions to form more harmonious patterns of operations.

In this AMA publication, executives of United Parcel Service, American Telephone and Telegraph Company, The Maytag Company, etc., discuss this subject and other recent developments. Also included are reports on organization planning dealing with basic considerations and the human element in successful planning. A concluding paper surveys the prospects for management growth in the next ten years.

Published by the American Man-

agement Association, 1515 Broadway, New York 36, New York. 55 pages. Price, \$1.75 (AMA members, \$1).

STRENGTHENING SUPERVISORY AND EXECUTIVE PERFORMANCE. How can managers and supervisors be prepared for future responsibilities? With management's resources expanding rapidly, tomorrow's executives will have to understand and evaluate important new trends in business and industry. They will face even greater challenges than before.

In this AMA publication, top executives report on their companies' *actual* experience in strengthening supervisory and executive performance for future operations. Papers include: a report by Roy C. Ingersoll, chairman of the board of Borg-Warner Corporation, on the necessity for analyzing management's rôle in our economy with greater depth; a discussion by T. W. Prior, director of training of the Goodyear Tire & Rubber Company, on his company's program of executive apprenticeship; and a presentation by E. H. Reed, manager of the education and personnel department of the International Harvester Company, of that organization's practical plan for executive development.

Another paper by Dr. Ralph T. Collins, psychiatrist of Eastman Kodak Company, offers a perceptive appraisal of executive life—its functions, problems, and hazards. Also included in this publication are a report on supervisory job performance studies and a discussion of integrity in business and its implications for management. Published by American Management Association, 1515 Broadway, New York 36, New York. 63 pages. Price, \$1.75 (AMA members, \$1).

ATOMIC ENERGY DEVELOPMENT. "Electric Power from the Atom," a new booklet recently published by Edison Electric Institute, trade association of the electric power industry, discusses the progress of the industry's program to produce electrical power with atomic fuel.

Illustrated with maps, charts, and drawings, the text deals primarily with five basic questions—how important is it, how is it made, what about its cost, when

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can we expect it, and what is being done to develop it?

Name of the constructing organization, type reactor, electrical capacity, location, and estimated cost of the 18 developmental atomic power plants being planned, developed, or constructed as of October, 1956, are listed. The data cover the 10 plants in which investor-owned power companies were participating at that time, as well as eight plants planned by other organizations.

The booklet contains the target dates for the first atomic-fueled generation of electricity on a large scale and estimates as to when it might be produced competitively with conventional fuel. The safety factor of atomic power plants is

discussed, along with other aspects of power supply, both atomic and conventional. A brief history of the United States' development of atomic power for purposes of war and peace is included.

Another section is devoted to EEI's Technical Appraisal Task Force on Nuclear Power, which is studying and evaluating the status of atomic reactor technology in the United States and elsewhere. The findings of this group will be made available to EEI member companies and to any other organizations interested in the development of economical atomic power.

The booklet may be obtained by writing to Edison Electric Institute, 420 Lexington Avenue, New York 17, New York.

How Not to Save Money

"A NEEDED \$400 million hydroelectric project on the Niagara river in New York has been delayed for years for purely political and ideological reasons.

"A group of tax-paying, publicly regulated private utility companies has long been ready to go ahead with it. But these utilities have been blocked by interests which want either the federal government or New York state to do the job. A bill favoring private enterprise development has been given an enormous amount of support by newspapers, and by commercial, agricultural, labor, and civic organizations. It once passed the House of Representatives by a wide margin, but that Congress adjourned before the Senate acted—and since then the 'blockaders' have been successful in their delaying tactics.

"An advocate of New York state development recently said that the power could be sold at about three mills by the state as against 4½ mills if private enterprise produced it. This claim was at once effectively answered. The 1.5-mill difference would result in a theoretical saving of \$12 million a year on the 8 billion kilowatt-hours of power the project would produce. But, against that, private enterprise would pay water rentals and taxes totaling \$23 million a year—whereas public development would be tax free. So the question arises: 'Where is there any public interest in benefiting certain groups to the extent of \$12 million a year and then penalizing others to the extent of \$23 million a year?'

"This tax factor is vitally important everywhere. The electric industry paid more than \$1.6 billion in taxes [in 1955], about \$1 billion of it to the federal government. Every time a socialized, tax-free project comes into being, it means that all the rest of us must pay higher-than-necessary taxes to compensate for the loss. Some saving!"

—EDITORIAL STATEMENT,
Industrial News Review.

The March of Events



FPC Orders Intermediate Decision Procedure Omitted

THE Federal Power Commission has ordered the intermediate decision procedure omitted in the proceedings involving a proposal by Texas Eastern Transmission Corporation, of Shreveport, Louisiana, to retire its "Little Inch" pipeline from natural gas service and to construct substitute facilities. The action means that the FPC will decide the case

directly without the filing of an intermediate decision by the presiding examiner who has conducted the hearings.

Texas Eastern plans to convert the Little Inch line to the transportation of petroleum products. The FPC in June, 1955, authorized the retirement of the Little Inch facilities, but the case subsequently was remanded to it by the U. S. court of appeals for the District of Columbia for further proceedings.

Arkansas

Gas Rate Plan Legalized

A BILL to legalize the "fair field" price theory of rate making for natural gas companies was given final passage by the state legislature on March 1st and subsequently signed by the governor.

It was this theory that provided the basis for a \$4.3 million rate increase granted to Arkansas Louisiana Gas Company in 1955 by the state commission.

The theory holds that a gas company should receive as much for the gas it produces as it pays for the gas it buys. Arkansas Louisiana produces about 20 per cent of its gas and purchases the rest.

Action by the state legislature came immediately after the state supreme court had overturned the Arkansas Louisiana increase on the ground that the fair field theory was not legal.

California

Governor Evades Trinity Power Issue

GOVERNOR Goodwin J. Knight on March 5th said he did not intend to take a stand on the issue of government *versus* public power on the federal gov-

ernment's Trinity river project. It is not his function, he said.

Knight acknowledged at a press conference that he spoke out in favor of public hydroelectric development on the \$225 million project back in 1954 when

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Congress was considering initial appropriations. But now, he said, "a new element" has cropped up. It is Interior Secretary Fred Seaton's recommendation that the Pacific Gas and Electric Company be given the franchise to build power plants on the Trinity.

U. S. Senator Thomas Kuchel (Republican, California) has come out against the PG&E plan, saying it would not be in the best interest of the people of California. In a recent telegram to Kuchel the Oakland chamber of commerce urged the Senator to withdraw his opposition to PG&E sharing in the proposed Trinity river project. The telegram stated:

This proposal, supported by President Eisenhower, deserves your 100 per cent support, particularly since it would afford a measure of tax relief in this critical period.

Knight declared that what he said in 1954 "was still right." He said that at the time his main concern was to expedite construction of the project, and that the Bureau of Reclamation then planned to build the power project. He said Seaton's

recommendation is that private power can do the job better and cheaper for the benefit of the people.

Seeks to Use Geysers to Generate Electricity

THE California Division of Corporations recently authorized sale of stock in a company which plans to generate electricity by using steam geysers.

The concern is Thermal Power Company, organized by three San Francisco businessmen. According to the company, it intends to get its power from the Big Geysers in Sonoma county, California. These geysers are formed by steam escaping under tremendous pressure from a few hundred feet under the earth. There are also some old wells in the area and the company said it would drill more.

Thermal Power said it figures steam now being blown off in this area could produce some 6,000 kilowatts of power. It plans to sell the power to a distributing utility, if it is able to harness it.

The company noted that similar thermal power is being developed in Italy, New Zealand, and elsewhere.

Colorado

Court Rules against Co-operative

THE state supreme court on March 4th declared that a rural electric co-operative, in seeking to invade territory of a private power company, had been guilty of "unlawful acts reminiscent of the railroad wars of the 1870's."

In an opinion written by Justice Francis J. Knauss, the high state court affirmed a judgment of District Judge Osmer E. Smith of Jefferson county in favor of Colorado Central Power Company and against the Intermountain Rural Electric Association.

Involved was a conflict over construction of two identical parallel power lines about half a mile in length along a public highway in Jefferson county to serve residents in Meadowbrook Heights subdivision.

The power firm sought an injunction to restrain the association from obstructing and hindering the plaintiff in the installation of power lines in the area and an order for removal of lines the association had erected. The co-operative challenged the jurisdiction of the trial court, alleging the company had failed to supply electricity to the area until April, 1955.

Mississippi

New Rules of Procedure Issued

ISSUANCE by the state public service commission of tentative new rules of practice and procedure and general rules applicable to all utility operations in the state was announced recently by Chairman Rubel L. Phillips. The rules would be made effective following a hearing. Utilities will be given an opportunity at the hearing to protest against any of the rules.

Phillips said the commission had drawn heavily upon the experience of utility regulatory agencies in other states in preparing the new state rules. One of the rules provides that on application of any party to a controversy before the commission, subpoenas may be issued by the commission requiring the attendance of witnesses for the purpose of taking testimony.

Such witnesses will be entitled to the same fees as are paid for like service in the circuit courts of the state, the cost

to be borne by the party at whose instance the witness is subpoenaed.

The rules further provide that informal complaints may be made to the commission and that the commission, in its discretion, may take up the matter presented with the utility involved in an effort to bring about satisfaction of the complaint without a formal hearing.

Procedure to be followed in the event a complaint cannot be settled informally is set forth by the rules.

The rules provide that certificates of public convenience and necessity will be granted on an area basis where appropriate, and the holder of such certificate will have the responsibility of rendering service to all applicants in the area where it is economically feasible to do so. Under these rules, the electric associations and the private power companies will each have a particular area certificated to them. Such utilities will then be able to make extensions within these areas without applying to the commission.

Nebraska

Sales Tax Gets Ax

THE revenue committee of the state legislature recently killed a bill calling for a 2 per cent tax on sales involving gas, electricity, heat, and communications, after representatives of utilities and industry had called the bill "discriminatory" and "unconstitutional."

The bill, LB 16, had no support at the hearing other than that of its introducer, Senator Terry Carpenter. Twelve persons spoke in opposition.

Donald Devries of Lincoln, representing the Associated Industries of Nebraska, told the committee that LB 16 would "close the door to new industry" coming into the state.

Ohio

Seeks Gas Rate Increase

IN a petition recently filed with the state public utilities commission, Dayton Power & Light Company asked authority to increase gas rates for Dayton con-

sumers which would result in a 30.4 per cent increase in average bills.

The present rate schedule for Dayton residential gas consumers is \$1 for the first 500 cubic feet or less; 7 cents per

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100 cubic feet for the next 2,500 cubic feet; $6\frac{1}{2}$ cents over 100 for the next 3,000 cubic feet; and 6 cents per 100 in excess of 6,000 cubic feet.

The new rate requested by the utility

is \$1.25 for the first 500 cubic feet or less; $8\frac{1}{2}$ cents per 100 for the next 2,500 cubic feet; $7\frac{1}{2}$ cents for the next 3,000 cubic feet; and 7.2 cents for 100 in excess of 6,000 cubic feet.

Oklahoma

Markham Dam Legislation Introduced

AN enabling bill to permit the Grand River Dam Authority to enter into a power contract with the Public Service Company of Oklahoma and to build the Markham's Ferry dam was introduced in the state legislature this month by a group of representatives from the northeastern part of the state.

The measure would raise the present debt limitations of the authority to \$105 million. Its enactment is needed before the authority can issue additional bonds to finance the proposed dam.

The authority has been negotiating for more than a year with the Public Service Company on a proposed power interchange contract, which is said to be necessary before the bonds can be sold.

Oregon

Hell's Dam Memorial Defeated

THE controversial memorial asking Congress to authorize a federal Hell's Canyon dam on the Snake river was defeated in the state senate this month on a straight party-line vote, 15 to 15. An immediate Democratic attempt to send the dead memorial back to committee where an effort could be made to resurrect it failed.

Sixteen senate votes were required for adoption of the memorial, which passed

the house by a 37-to-18 vote on January 28th. No votes were switched. The fifteen Republicans held the line against the proposal and the fifteen Democrats voted solidly in favor of its adoption.

Senator Yturri, Ontario, chief spokesman for the Republican senators in the debate, said the memorial represents an attempt to ask Congress "to substitute our judgment for the judgment of the Federal Power Commission, the federal courts, and past Congresses."

Washington

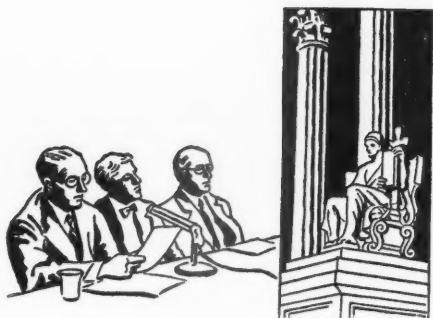
Atomic Energy Bill Passed

THE state senate on March 6th approved two house bills which create a co-ordinator and advisory council on nuclear energy and an administrator of courts. Both measures were requested by Governor Rosellini.

The atomic energy bill, HB 3, would permit the governor to appoint a co-ordinator with a salary of not to exceed \$20,000 a year. A five-man advisory committee would also be created.

The new agency would co-ordinate the activities of state agencies with those of the federal Atomic Energy Commission in the development of nuclear resources in Washington. HB 3 was passed unanimously by the senate.

The bill to establish an administrator for courts authorizes the supreme court to appoint the administrator, who would study and make recommendations on dockets and the general operation of the state's judicial system.



Progress of Regulation

Trends and Topics

Depreciation in Relation to Dollar Value

RECOGNITION, by the Indiana commission, of changing dollar values as affecting depreciation allowances revives a controversy dating back to the early days of regulation. (The Indiana decision, 16 PUR3d 490, was reviewed in *PUBLIC UTILITIES FORTNIGHTLY*, February 28, 1957, at page 349.) The question is whether changing dollar values resulting from inflation and deflation, instead of original cost of plant, should enter into the computation of depreciation. Is the purpose of a depreciation allowance to meet replacement cost or to repay to the owners what they invested in plant? Should ratepayers pay an amount equal to the value of plant used up during the current year or what the plant cost when it was installed?

Switch in Supreme Court Views

The United States Supreme Court, as constituted in 1930, not only approved present value as the rate base but said it would be wholly illogical to adopt a different rule for depreciation. Manifestly, the amount set aside periodically for the purpose of restoring property worn out or impaired, said the court, could not be limited by the original cost because if values have advanced the allowance is not sufficient to maintain the level of efficiency. These views were expressed in the *United Railways & Electric Company* case (280 US 234, PUR1930A 225), but reference was made to the *Knoxville Water Company* case, decided in 1909, when it was said that the utility is entitled to see that from earnings the value of the property invested is kept unimpaired so that at the end of any given term of years the original investment remains as it was at the beginning. The Supreme Court, after making that reference, said that "this naturally calls for expenditures equal to the cost of the worn-out equipment at the time of replacement; and this, for all practical purposes, means present value."

But the Supreme Court, in the *Natural Gas Pipeline Company* case, in 1942, ruled that an amortization base founded on investment is sufficient, even though reproduction cost during the period may be more than actual cost, when the

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amortization base will be completely restored at the time when, by hypothesis, the business will end by the annual amortization allowances (315 US 575, 42 PUR NS 129). Then in the Hope Natural Gas Company case the same court ruled that annual depreciation should be based on cost, overruling the 1930 decision favoring reproduction cost or fair value (320 US 591, 51 PUR NS 193).

State Court and Commission Views

Support for cost as the depreciation basis will be found in such decisions as those of the Alabama commission in the Southern Bell Telephone & Telegraph Company case (4 PUR3d 195), the Arkansas commission in the Southwestern Bell Telephone Company case (2 PUR3d 1), the Illinois commission in the Peoples Gas Light & Coke Company case (99 PUR NS 361), the New Jersey commission in the Elizabethtown Water Company case (11 PUR3d 174), the North Carolina supreme court in the Southern Bell Telephone & Telegraph Company case (3 PUR3d 307), the Utah commission in the Mountain States Telephone & Telegraph Company case (2 PUR3d 75), and the Virginia supreme court in the Alexandria Water Company case (7 PUR NS 53).

Among the decisions in favor of recognizing changed price levels may be noted those of the Arizona commission in the Arizona Edison Company case (13 PUR NS 325), where the actual cost of depreciable facilities was uncertain, and the Missouri supreme court in a case involving the Laclede Gas Light Company (22 PUR NS 6). The Indiana supreme court stated that decisions of the United States Supreme Court are controlling on the federal question whether rates fixed by a state commission are confiscatory because depreciation is computed upon some other basis than present value, with the result that the return is so inadequate as to result in confiscation of property (10 PUR NS 67).

The Michigan supreme court once said that if the rate base was present fair value, as then required, the depreciation base as to depreciable property was the same thing. The court said there is no principle to sustain a holding that a utility may earn on the present fair value of its property devoted to public service, but that it must accept and the public must pay depreciation on book cost or investment cost regardless of present fair value (PUR1925C 158). But after the changes in views on a fair value rate base the state commission, in 1954, expressed the opinion that original cost as a basis for computing depreciation should not be abandoned in favor of replacement cost since the former is stable, easily understood, and has secured almost universal approval over the years both for tax and rate-making purposes (5 PUR3d 301).

Strong opposition to a depreciation allowance based on reproduction cost was expressed by Chairman Maltbie, of the New York commission, in the Yonkers Railroad Company case (PUR1933B 61, 84). He said he "disagreed completely" with the Supreme Court decision in the United Railways & Electric Company case (PUR1930A 225), "notwithstanding what may have been said by Mr. Justice Sutherland." He explained his views at length. But a New York

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court ruled that allowances for depreciation could not be limited by original cost because if values advanced the allowance was not sufficient to maintain a level of efficiency (6 PUR NS 1). The court decided that depreciation should be calculated on present value since the utility is entitled to see that from earnings the value of the property invested is kept unimpaired so that at the end of any given term of years the original investment remains as it was at the beginning, and this calls for expenditures equal to the cost of the worn-out equipment at the time of replacement. Nevertheless, the New York commission has consistently based depreciation allowances on original cost. The commission, for example, struck out testimony as to reproduction cost as a basis for depreciation (60 PUR NS 385; 68 PUR NS 406).

The Pennsylvania superior court has held that the commission acted properly in calculating annual depreciation at an amount sufficient to enable a company to recover the original cost of its property (96 PUR NS 161). The state commission, although considering reproduction cost or trended original cost for the purpose of fixing a fair value rate base, has applied annual depreciation rates to the original cost of plant (16 PUR3d 207).

The West Virginia commission, in 1925, ruled that the fair value is to be amortized rather than the book cost (PUR1925B 705). Later, in 1927, the same commission said it is the book cost or original investment that must be amortized and not the value (PUR1928B 20).

The Texas supreme court recently declared that the item of depreciation of a given piece of property appearing in current expenses for rate purposes should be closely correlated with the "fair value" appraisal of the same piece of property from year to year and the whole should be consistent (13 PUR3d 90).

Review of Current Cases

State Commission Assumes Jurisdiction over Mobile Communication by Telephone Company

THE California commission has assumed jurisdiction over the leasing and maintenance of mobile telephone equipment by the Pacific Telephone & Telegraph Company. After an investigation on its own motion, the commission lifted an earlier suspension of rates proposed for the service. Mobile telephone service, then, as undertaken by the company is now a regulated public utility service.

The filed rates were generally the same as charges made by Pacific for such serv-

ice under private contracts. As of early 1956, the company had 214 contracts for private mobile systems, along with many requests for service on hand.

Pacific will provide service to users other than telephone companies, licensed by the Federal Communications Commission in maritime, aviation, public safety, industrial, land transportation, or citizens' radio services. Under the proposed lease and maintenance arrangement, the station licensee will be responsible for securing from the federal commission necessary

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authorization for the communication system. Such licensee will also have exclusive control of the facilities and be fully responsible for their use in accordance with Federal Communications Commission rules.

Mobile Telephone a Utility Service

It was contended that the proposed service was not public utility in character. Pacific claimed that it was not limited to land lines in conducting its telephone business. It indicated that it has furnished telephone service by radio in California for many years and that much of its present network in the state consists of radio equipment and channels used for point-to-point as well as mobile communications.

The company said that it was ready to serve the public without discrimination and pointed out that all the protesting suppliers of private mobile service had expressly reserved the right to refuse service at their option. The commission found that Pacific had in fact dedicated its mobile communication property to the public use, that the company was a public utility, and that its offering to lease and maintain mobile systems was an offering of public utility service under California law.

Unfair Competition and Court Decree

It was charged that Pacific, whose private communication service was not then subject to regulation, sought by filing tariffs with the state commission to bring the service within state regulation and circumvent a federal court consent decree enjoining the company, as a subsidiary of American Telephone and Telegraph Company, from engaging in any business other than the furnishing of common carrier communication. Protestants urged that this service by a large telephone company would be unfairly competitive to small private business concerns offering similar

service. Fears of ultimate monopoly of the service by Pacific were voiced.

Pacific said there was no substance to the charge of unfair competition because it would have to offer service at a fixed rate, while all other competing concerns were free to underbid the utility. The commission thought the fears expressed by protestants were not proved on the record.

The commission noted that there was no proof on the question of the company's intent to avoid the consent decree and observed that in any event it was for the federal courts and not for the commission to implement their decisions. Moreover, the commission interpreted the decree as assuming that activities such as those here concerned could be performed by the company without injury to the public welfare, so long as they were regulated by the state commission.

Interstate Law

The commission observed that the Communications Act of 1934 makes it clear that the Federal Communications Commission has no jurisdiction, except under the radio licensing provisions of the act, over intrastate communication service by radio and that interstate communication by radio does not include communication between points in the same state if such communication is regulated by a state commission. The federal law, said the commission, clearly does not preclude state regulation of the mobile telephone service proposed by Pacific.

Required by Public Convenience

Except for the city of Los Angeles, all the protestants either were operators in the private mobile radiotelephone field or represented such operators. Their own convenience would be served by the elimination of a competitor, the commission commented. On the other hand, users of

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Pacific's service testified that it was excellent, reasonably priced, and needed. It also appeared that the service was not otherwise offered to all takers and that some persons who wanted such service could not otherwise obtain it. The commission was convinced that the public convenience and necessity required the authorization of Pacific's mobile service.

Effect on Telephone Service

There was no convincing proof that the proposed service and the filed rate schedule would have any substantial, deleterious

effect on the company's primary obligation, the provision of basic exchange and toll telephone service. However, in authorizing the company's rate schedule, the commission required that separate records be kept with respect to the new service in order that any possible loss resulting from such operations would never fall upon users of regular telephone service. Charges for special equipment were required to be modified, and other such conditions were prescribed. *Re Pacific Teleph. & Teleg. Co. Decision No. 54438, Case No. 5754, January 29, 1957.*



Water Company Directed to Fluoridate Supply

THE California commission directed a water company to fluoridate its supply upon a showing, by a preponderance of evidence, that the injection of fluorides would promote the health of the customers. The commission made it clear that its action in the case was not to be understood as holding that a water utility which did not fluoridate its water supply was violating the law.

Religion Factor

Protestants had contended that requiring the company to fluoridate the supply would violate constitutional guaranties, among which was freedom of religion. Customers disclaiming use of drugs and chemicals for medicinal purposes claimed that they would be forced into using them if fluorides were added to the water supply.

The commission concluded that constitutional rights would not be unlawfully infringed by requiring fluoridation. A fundamental constitutional principle, said the commission, is that a person is entitled to adhere to any religious belief he may choose. However, there is another principle which is equally true and funda-

mental, that no person may, by exercising his religious belief, infringe the sovereign power of the state to provide for the health, safety, or general welfare of its citizens. When these two principles collide, the power of the state must prevail.

Concurring Opinion

Commissioner Untereiner, in a concurring opinion, raised some interesting questions with regard to the commission's jurisdiction to order fluoridation on the basis of medical evidence, as distinguished from quality standard evidence. He did not believe that the commission was qualified to find that the injection of fluorides into the water supply would promote the health of and not cause injury to the customers.

The commissioner was convinced that the "health" of a water utility's customers, as the legislature ordered the utility and the commission to promote and safeguard it, was such health as would be promoted by the provision of clean, pure water in adequate quantities. The legislature did not intend to order water utilities to enter into the unlicensed practice of medicine, nor to authorize the commission

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to order the water utilities to do so.

The expansion of a utility's duties, and of the power of the commission, under its interpretation of the statutes, was frightening to the commissioner. A commission that can find as a fact that fluorides contribute to health, pointed out the commissioner, would have no difficulty in finding that vitamins do likewise—and in ordering them added to the water supply. There was no forecasting what the potentialities might be for some of the new wonder drugs.

The statute, said the commissioner, was not limited to water utilities. Bus companies, under the philosophy of the commission's finding, might properly be ordered to provide "massaging seats, sun

lamps, and psychiatric treatment en route." The field for innovation was almost boundless. That something may be good for people does not in itself justify the commission in ordering a public utility to supply it.

The commissioner would have based the order on a finding that fluorides provide a different kind and quality of water and that the consumers in that area wanted that different kind and quality. Such a finding, in his opinion, would have eliminated the necessity, and broad implications flowing therefrom, of finding that fluoridation was medically beneficial. *City of Oroville v. California Water Service Co. Decision No. 54444, Case Nos. 5628, 5650, January 29, 1957.*



Discriminatory Telephone Rates to Air Force Base Ordered Amended

SUSTAINING a complaint by subscribers at Chanute Air Force Base, the Illinois commission ruled that Eastern Illinois Telephone Company's rates discriminated against them. The rates were substantially higher than those applicable to the village of Rantoul, whose limits include the base area.

In 1952, before Rantoul took the base into its village limits, the company extended telephone facilities to about 500 new residential subscribers on the base at a total cost of approximately \$92,000. To a base rate the company applied mileage charges under its tariff. In this proceed-

ing it contended that the base rate area at the time of filing rates was controlling, and at that time Chanute Air Force Base was not within the village limits.

The commission found no present justification for the difference between the company's rates to the military base and the rates applicable to Rantoul. It indicated that the Air Force base should be included in the base rate area of the Rantoul exchange. New rates were ordered to be filed making Rantoul rates applicable to Chanute Air Force Base. *Whitaker et al. v. Eastern Illinois Teleph. Co. No. 42954, January 22, 1957.*



Natural Gas Act Authorizes Rate Conditions On Producer Certificate

PUBLIC convenience and necessity reasonably required the imposition of a rate condition on the issuance of a certificate to an independent natural gas pro-

ducer, the United States court of appeals ruled on appeal from a Federal Power Commission order.

The commission, in granting the certifi-

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cate, imposed a rate of 10 cents per Mcf. Evidence showed that all other sales in the producing area were at 10 cents or less.

Testimony of interveners indicated that if this producer were permitted to sell for 12 cents per Mcf as proposed, the market price in the whole area would be forced up to that level. The producer did not offer any evidence to prove that 12 cents was a reasonable rate. Nor did it contend that 10 cents would be confiscatory. The court thought the record amply supported the commission's order.

Statutory Power

Section 7(e) of the Natural Gas Act provides in part:

"The commission shall have the power to attach to the issuance of the certificate and to the exercise of the rights granted thereunder such reasonable terms and conditions as the public convenience and necessity may require."

The producer insisted that the commission has no power to attach rate conditions under § 7(e). It argued that if the

commission is dissatisfied with a rate, it may take action under § 5(a). It was asserted that the 12-cent rate which the company had been charging under an emergency certificate had "become invested with a compelling and decisive legal significance." This rate, the producer said, constituted the only legal rate.

The court conceded the correctness of the last proposition in the sense that no other rate could have been charged while the temporary certificate was in effect. But the commission, in accepting the company's 12-cent filing when it granted the temporary certificate, did not preclude itself from exercising its conditioning power under § 7(e).

The commission's interpretation of § 7(e) as including authority to impose rate conditions must be given considerable weight, said the court, especially since that interpretation has been left undisturbed by Congress over the years. The court concluded that the 10-cent rate condition was clearly within the commission's statutory authority. *Signal Oil & Gas Co. v. Federal Power Commission et al.* 238 F2d 771.



Tariff Provisions against Telephone Directory Covers Generally Upheld

THE use of telephone directory covers furnished to telephone subscribers by a private firm and obscuring instructions and other information on the directory, besides containing advertising matter in competition with advertising listed by the company itself, may properly be prohibited by tariff provisions, the New York commission ruled.

Two companies' tariff provisions under investigation provided that no covers, unless furnished by the companies, could be used on directories. It was also provided that the directories remain company property.

Interference with Service

The commission found that the use of any attachment or cover which tends to obscure any portion of the directory has a tendency to interfere with telephone service. Nor is it of any consequence that the cover may itself contain the information so obscured, since the information may not be kept current, or it may be otherwise incorrect. However, following the recent Hush-A-Phone Case (15 PUR3d 467), the commission said it would seem that if a cover impaired only the subscriber's ability to use the directory, that might

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not of itself be sufficient to bar its use. In the instant case, the commission noted that errors on unauthorized covers could delay service and might be serious in emergencies.

Competition and Property Rights

The commission determined that any attachment or cover containing solicited advertising in competition with advertising listed by the company itself for its directory is an invasion of the company's property rights and constitutes unfair competition. Such competition may reduce revenues and thereby cast an additional burden upon the subscriber.

One of the companies presented evidence of specific loss of advertising revenue resulting from cover advertising proscribed by its tariff. It complained of a developing resistance to sales of classified advertising in its directory. The commis-

sion noted that if some outside agency is allowed to "skim off the [advertising] cream" or to offer competitive rates for substantially the same advertising service, the directory publishing companies will insist on contracts which are less favorable to the telephone companies.

It was concluded that the intent of the companies' tariff provisions respecting the use of covers was lawful. But the commission indicated that the provisions were perhaps too broadly framed. An ornamental folder, which is individually acquired and not so attached as to prevent the use of the directory, clearly would be a proper use by the subscriber, the commission said.

Since the problem was of statewide interest, the commission indicated that it would direct its staff to investigate the possibilities of a standard provision. *Re Cazenovia Teleph. Corp. et al. Case 18130, February 18, 1957.*



Attrition Reflected in Telephone Rate Increase

PACIFIC TELEPHONE & TELEGRAPH COMPANY obtained authority from the Oregon commission to increase rates sufficiently to produce a rate of return of 6.32 per cent on an original cost rate base. This was calculated to provide a return on equity of somewhat above 8½ per cent. A further increase in rates to offset proposed salary and wage adjustments was denied.

The commission applied the statewide principle in fixing the new rates. Most state commissions, it was noted, have adopted this principle for utilities operating in more than one locality. Revenue requirements for a telephone company are thus computed from costs throughout the state, and the rates for each locality are based not on local costs but on the over-all revenue requirements, so that rates are uniform according to the kind of service

and the size of the telephone exchange.

Attrition was recognized as an important factor to be considered in rate making. Noting the present "spiral of inflation," the commission pointed out its effect on investment in telephone plant facilities. At the beginning of 1953, the average investment per telephone in Oregon was \$264. New telephones installed since then have cost about \$362 per station, increasing the average investment per station to \$282.

Cash working capital was excluded from the rate base because of tax accruals and other internally generated funds. Materials and supplies, described as an integral part of the maintenance and operation of the utility, were included. Actual taxes paid by the company were included in operating expenses. *Re Pacific Teleph. & Teleg. Co. U-F-1988, January 2, 1957.*

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Telephone Co-operative Not Qualified to Obtain Certificate

THE Missouri commission denied a telephone co-operative's application for a certificate of public convenience and necessity to do business within certain state areas. Although Missouri authorizes the formation of nonprofit rural electric co-operatives, there is no comparable statute authorizing the formation of nonprofit telephone co-operatives.

The applicant could acquire no legal status in Missouri to conduct business or carry out purposes consistent with its articles of incorporation. It was not a legal entity subject to suit or able to sue, so could not demonstrate its qualification to do business in the state. The commission

could not confer any status on such a subject in conflict with other state laws.

Even assuming that the applicant was able to furnish telephone service in the state under its corporate name and in conformance with its charter, said the commission, it still would not be subject to commission jurisdiction. Its services would not be available to the general public, which is fundamental to being a public utility. Rather, it would only be available to members. The applicant's form of business organization was repugnant to the definition of a public utility. *Re Craw-Kan Teleph. Co-op. Asso., Inc. Case No. 13,421, January 30, 1957.*



Condemnation of Land for Transmission Line Upheld

THERE was ample evidence, a Pennsylvania superior court ruled, to support the commission's order approving the condemnation of land by an electric company for an overhead transmission line. The company proposed to take a strip of land 150 feet wide with 50-foot trimming rights on each side.

In an earlier appeal the court ruled on the question of necessity and selection of route for the proposed line. This question was not seriously challenged in this proceeding. Contentions of opposing parties concerned whether the line should be placed underground instead of overhead and whether by underground construction the cost could be reduced.

The court observed that these considerations had been weighed by the commission, and since its determination was not arbitrary or unlawful the court would not interfere.

It was contended that the 150-foot strip with trimming rights on each side was

arbitrary and unconstitutional. The court rejected this contention since it was not disputed that the 150-foot right of way was necessary and whatever damages were ascertained must be paid to the property owners.

Township Control and Tax Loss

An intervening township claimed that the proposed line would violate its ordinance regulating the construction of such lines and that the taking of the strip would deprive the township of tax revenues. The court found no merit in the claim.

The regulation of utilities, the rendering of adequate and efficient service, and the making of necessary changes rest in the first instance with the commission, the court declared. This control, in the interest of service to the public, transcends the legitimate objectives of political subdivisions.

The township could not regulate the construction of the transmission line.

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And the mere fact that a political subdivision is deprived of possible tax revenue, the court indicated, has never been con-

sidered controlling in eminent domain proceedings. *Morris et al. v. Pennsylvania Pub. Utility Commission*, 128 A2d 105.



Relationship of Return to Net Operating Income More Important Than Percentage

A RETURN of 2.19 per cent was considered adequate by the Mississippi commission to provide for the efficient operation of a small independent telephone company, pay expenses, fixed charges, preferred and common stock dividends, and maintain a surplus. With an established rate base, said the commission, the rate of return is a function of the net operating income. Thus, if the net operating income is fair and reasonable, as a corollary, the rate of return is fair and reasonable, whatever the percentage.

The percentage of the return is meaningless when viewed by itself. It has to be subjected to well-recognized tests before its true significance can be determined. In this case, the rate of return appeared to be low because of the extremely low cost of capital to the company. It was operating on approximately 97 per cent borrowed money and only 3 per cent capital stock. Interest on the long-term debt was only 2 per cent, but the amount of such debt to the REA was \$420,000.

Cost of Capital

The commission allowed earnings of 5 per cent on the 5 per cent preferred stock and about 10 per cent for dividends on the common stock and for surplus. The seemingly high percentage of 10 per cent, pointed out the commission, was allowed because the risks of operating a small independent utility are much greater than for a large utility which might have ready sources of capital.

The allowance for cost of equity capital, said the commission, must be deter-

mined for each company upon the peculiar facts and circumstances affecting it. The 10 per cent allowance for dividends on common stock in this case could not be taken or considered as a precedent in any other case. If the ratio of equity capital to debt capital in any particular case were greater, the rate of return would be increased correspondingly.

The commission cited other jurisdictions which had granted a low rate of return to a small telephone company under similar circumstances. The California commission had recently approved rates which would give a return of 3.1 per cent to an independent telephone company. The Ohio commission had authorized an increase for the Arthur Mutual Telephone Company amounting to a return of 2.48 per cent. The Minnesota commission had approved rates for an REA-financed telephone company which resulted in a rate of return of 2.78 per cent on the net investment.

Rules for Return Allowance

To illustrate the absurdity of any rule that would arbitrarily apply a predetermined rate of return to a rate base the commission supposed a rate of return of 5 per cent in the present situation. When applied to the company's rate base of \$439,841 the result would be \$21,992, or the amount of earnings the company would enjoy. This, despite the fact that stockholders had invested only \$13,980 in the company, as represented by the total common and preferred stock outstanding.

The determination of just and reason-

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able rates is not an exact mathematical science, said the commission. It requires the exercise of a fair and enlightened judgment based on the facts and circumstances at the time of the rate proceeding. That which might be adequate for one

utility might not be fair for another, depending on the differences in circumstances. Each utility presents an individual problem. *Mississippi Pub. Service Commission v. Home Teleph. Co., Inc. Docket No. U-38, January 23, 1957.*



Transit Fare Increased to Twenty Cents

SHOWING considerable deficits for four of the last five years, along with operating cost increases, a transit company obtained the Massachusetts commission's approval of a rate increase. The company was authorized to increase the base fare from 15 cents to 20 cents as proposed.

Total revenue passengers had steadily declined from nearly 2½ million in 1946 to only 579,000 in 1956. Besides this trend, the rate increase was calculated to produce an additional decline of about 10 per cent.



Low Return Justified by High Rate

IN applying to the Colorado commission for a water rate increase, a power company stressed the fact that it was not asking for the maximum rate of return allowable, since it realized that even under the rates proposed the customer would have to pay considerably more for water than had been paid for the past thirty-six years. The company merely wanted to get out of the red and into the black.

The commission allowed a rate, which, although lower than had been requested, would enable the company to accomplish its desires. Were the company to endeavor to obtain the maximum rate of return to which it might legally be entitled, said the commission, it could very well find itself in the position of pricing itself out of the market by having rates that were too high.

The new rates and the rate of return

Taking into account the decline in patronage, the increased fares would probably result in an operating ratio of 96.5 per cent. The commission noted that it had allowed operating ratios substantially lower than this figure in other proceedings, and it expressed doubt that 96.5 per cent was low enough to put this company on a sound basis, in view of its past history and the volatile nature of its revenue figures. *Re Dedham-Needham Transit Lines, Inc. DPU 12048, February 20, 1957.*

could not be based on the original cost rate base which the company was in the process of preparing for its entire operation. The necessity of relating the return to the original cost rate base was minimized in this instance because of the low return involved. Estimates by the commission and its staff placed the return at 1.58 per cent.

Tapping Fees Disallowed

The company had proposed a tapping fee for the privilege of connecting new customers to the system, varying from \$500 for a five-eighths-inch tap on the main, to \$20,000 for a 4-inch tap. The company claimed such fees were necessary in order to help provide "back-up service," consisting of additional main-line capacity, water storage reservoirs, water supply source, purification and treatment fa-

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cilities, pumping capacity, etc. The fact that the investment per customer by the company in the water system was quite high was advanced as the justification for the fees. By having customers pay for "back-up" facilities by the proposed tapping fees, investment per customer would be reduced materially.

Customer Investment

That the investment per customer was high must have been known to management when it elected to make the purchase, pointed out the commission. Future customers of the company should not be made to pay any more for a service connection

on that system than would have to be paid under the general rules of the commission on another system.

Another way to reduce the investment per customer, said the commission, was to encourage people to locate in the area by the furnishing of adequate utility service without service connection fees of such an amount that might undermine future growth. The commission believed the company was being treated fairly when it allowed a charge of one-half of costs for connection in lieu of the proposed tapping fees. *Re Colorado Central Power Co. Docket No. 385, Decision No. 47027, December 31, 1956.*



Passenger Train Discontinuance Denied in New York, Granted in Wisconsin

Two separate cases involving requests of two different railroads to discontinue certain passenger trains resulted in different conclusions by the New York and Wisconsin commissions. Both applications had involved proposals to substitute other service.

New York Commission

The Delaware & Hudson Railroad had proposed eliminating three local trains and diverting all express, mail, and passenger traffic to the Laurentians, the railroad's crack northbound and southbound express trains. The New York commission denied the request, pointing out that the railroad, having built up the prestige and reputation of the express trains over a period of more than three decades, now proposed to cast that accomplishment to the winds.

The company's plan, said the commission, amounted to a downgrading of two fine trains at a time when the management should direct its efforts to enhancing the prestige and improving the service of

those trains. The economic upsurge of the territory had brought a large influx of people with social and business connections in other parts of the state, and the convenience provided by the express operation of the Laurentians was now needed more than ever.

To make up time lost in local stops, the company had proposed speeding up the trains over a distance marked by frequent curves in the road where operations were subject to certain speed restrictions. To shorten the running time over that part of the railroad, said the commission, would certainly not add to the safety and comfort of passengers.

Wisconsin Commission

The Wisconsin commission, considering a similar type request by the Chicago, Milwaukee, St. Paul & Pacific Railroad, approved the application with certain conditions.

The rail patronage on the trains in question had declined approximately 30 per cent. Losses on the operations in-

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volved were substantial. System passenger operating ratio on a fully allocated cost basis had been 155.84 per cent for the calendar year 1955. The over-all rate of return on property investment for the railroad was 2.07 for 1955.

Operating Losses

Balancing the carrier's loss with the inconvenience and hardship to the public if the service was discontinued resulted in the commission's favorable action. The railroad had proposed operating contract bus service between the discontinued points. Essentially, pointed out the commission, the application was for the sub-

stitution of motor transport over a portion of the route involved, a partial rescheduling of the service, and, in fact, the establishment of additional service for a certain point. The inconvenience and hardship to the public had to be measured in terms of the difference in service rather than omissions or discontinuance. The proposed service, with the exception of one or two communities, would be equal to, or possibly superior to, the present service afforded as measured by the respective use at the various points. *Re Delaware & H. R. Corp. Case 17992, January 28, 1957; Re Chicago, M. St. P. & P. R. Co. 2-U-3110, January 25, 1957.*



Transit Fare Increase Only Feasible Corrective Measure

A TRANSIT company, plagued by decreasing revenues resulting from the loss of school contracts to a corporation not subject to regulation, appealed to the Massachusetts commission for increased fares.

The application was granted, and would produce an operating ratio of 99.06 per cent.

It appeared that had the company been successful in obtaining the school con-

tracts, the present application would have been unlikely. The commission pointed out, however, that under existing statutes it was powerless to protect the regularly certificated carrier in situations of this nature even though the only other corrective measure feasible was an upward revision in the entire fare structure, working to the disadvantage of regular riders. *Re Plymouth & B. Street R. Co. DPU 11972, January 31, 1957*



Commission Refuses to Order Extension Outside Prescribed Service Area

THE Utah commission denied a real estate subdivision owner's application for an order requiring a water company to extend service. The evidence showed that the company would not have sufficient water to provide for present and future needs of customers within its area if it commenced supplying applicants outside its area.

The subdivision owners had contended

that the company was estopped from evading service by virtue of a contract entered into with them. Although the commission concluded that the case need not be decided on the question of estoppel, it pointed out that any redress for damages concerning estoppel is a matter for a court of law. The commission had no jurisdiction to award damages.

Although all contracts relative to serv-

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ice were subject to commission approval or disapproval, it did not follow that, because one of the parties to the agreement was estopped from evading its obligations, the commission must require performance. The commission is as free to ignore the terms of any such agreement with a public utility as it is to enforce or deny it. In other words, jurisdiction cannot arbitrarily be forced upon the commission to enforce the terms of the contract even

though at law the company might be estopped from evading performance. If such jurisdiction could be forced upon the commission, the execution of contract terms might be found to be against the public interest and indirectly undermine the very authority granted the commission in regulating public utility affairs. *McMullin Construction Co. v. Union & J. Irrig. Co. Investigation Docket No. 69, January 16, 1957.*



Commission Will Ask Court to Compel Municipal Rate Increase Equal to Production Cost

WHILE the Massachusetts commission recognized that it had no jurisdiction to compel a municipality operating an electric plant to increase its rates sufficiently at least to equal production cost, it indicated that it would petition the state supreme court to compel the fixing of proper rates. This proceeding was brought by trustees under an indenture of trust, requesting an investigation of the rates. By express statute provision the commission had no jurisdiction over the

"maintenance and operation" of the municipal plant. The commission interpreted this to include jurisdiction as to rates. But under a general statute it was provided that "No price . . . shall, without the written consent of the department, be fixed at less than the production cost . . ." The commission thought the municipal rates, shown by expense data to be below cost, were violative of this provision. *Trustees of Naushon Trust et al. v. Town of Gosnold, DPU 11737-A, February 5, 1957.*



Ordinance Prohibiting Low Flights Held Invalid on Federal Pre-emption Grounds

THE federal system, a United States court of appeals ruled, has pre-empted the field of air commerce below 1,000 feet altitude as well as above. An ordinance of the village of Cedarhurst, New York, near Idlewild Airport, prohibiting flights over the village at altitudes under 1,000 feet was held to be invalid. A lower court judgment granting an injunction against the ordinance was affirmed.

Under the Civil Aeronautics Act of 1938, the Civil Aeronautics Board was given power to prescribe "rules as to safe altitudes of flight." The board's regula-

tions, under certain weather and other conditions, allowed flights over Cedarhurst at altitudes as low as 450 feet. The court thought the statute clearly empowered the board to make rules as to safe altitudes of flight at any elevation.

Delegation of Authority

The village contended that the board's regulations permitting low flights were the product of an invalid delegation of legislative power by Congress. It was argued that the word "safe" was not a sufficiently definitive standard to permit

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valid administrative action under the delegation.

The court said it was not necessary that Congress prescribe a standard that could be applied with mathematical certainty. It is sufficient if an intelligible principle is set forth to guide administrative action.

"Taking" of Private Property

It was also contended that the low flights amounted to a taking of private property without compensation in violation of the Fifth Amendment. Noting earlier judicial authority, the court observed that flights over private land are

not a "taking" unless they are so low and so frequent as to be a direct and immediate interference with the enjoyment of the land.

In the instant case, there was no regularity of low flights, and most flights over the village occurred at 1,000 feet or higher. Nor was there any evidence that the flights constituted a trespass or nuisance to the residents. In these circumstances, said the court, there was no "taking" within the meaning of the Fifth Amendment. *Allegheny Airlines, Inc. et al. v. Village of Cedarhurst et al.* 238 F2d 812.



Telephone Company Wins Territorial Dispute With Co-operative

ON appeal to the Pennsylvania superior court, a privately owned telephone company won affirmance of a commission order dismissing a complaint by a telephone co-operative charging territorial encroachment. Under Pennsylvania law a co-operative is not a public utility subject to commission regulation. It cannot be compelled to serve anyone who is not a member.

Territorial Agreement

The company had charter rights to furnish telephone service in the disputed area. But several years ago the company and the co-operative agreed upon a division of territory which excluded the company from the area here in question. However, the evidence indicated that the co-operative's service in the area was unsatisfactory and that needed service was not provided.

Any agreement which restricts the obligation of a utility to render service in its chartered territory, said the court, is tantamount to an abandonment of its franchise to that extent and to be effective

must be approved by the commission. The agreement involved in this case was not so approved and, therefore, could not validly impair the company's duty to serve. Residents in the area have a legal right to the service which the company is bound to render under its charter.

Public Interest

In view of testimony of subscribers in the disputed area as to the co-operative's service, the court sustained the commission's determination that the public interest would be served by the extension of the company's service into the area.

The actual extension was accomplished from existing lines, though the company did not obtain prior approval by the commission.

The court indicated that it was unreasonable to contend that prior commission approval must be sought every time a new subscriber in authorized territory is given service by extension of existing lines. But even conceding that the company should have secured prior permission in this instance, the commission

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would not have been warranted in sustaining the complaint and requiring the company to discontinue such extended service, the court observed. Such action

would have denied the public a needed service. *Wattsburg Teleph. Co-op. Asso. v. Pennsylvania Pub. Utility Commission*, 128 A2d 160.

Other Recent Rulings

Fire Hydrant Rate. For customers installing fire hydrants at their own expense, the Missouri commission authorized an annual charge of \$24 for fire hydrant service, computed by reducing the regular \$48 annual charge for company-installed hydrants by 8 per cent (6 per cent rate of return plus 2 per cent depreciation rate) of the total cost of a fire hydrant installed. *Re Raytown Water Co. Case No. 13,519*, January 22, 1957.

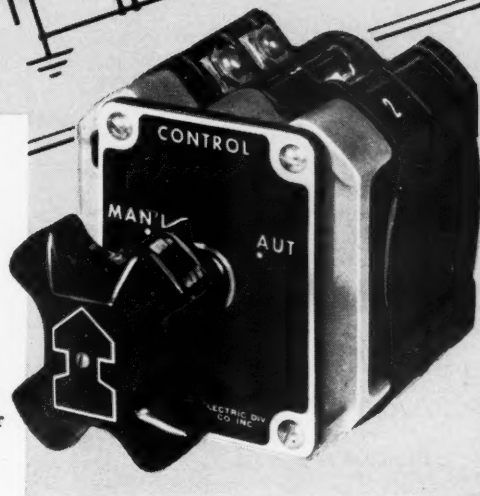
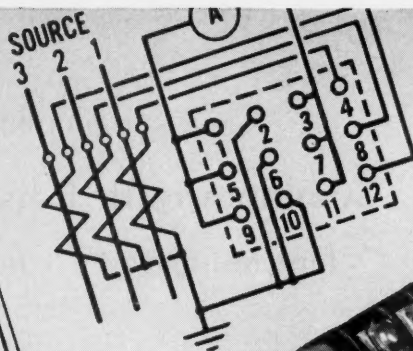
Propane Plant Authorized. The Illinois commission authorized a gas company to construct and operate a propane-air gas production plant at Galesburg, Illinois, with a capacity of 250 Mcf per hour of equivalent 1,000 Btu natural gas, in order to enable the company to serve additional customers, to control peak demands for purchased natural gas, and to provide emergency service in the event of a failure of its pipeline supply. *Re Illinois Power Co. No. 43880*, January 22, 1957.

Attrition Factor in Return. The California commission, although considering a return of 6.5 per cent reasonable for a gas company engaged in the business of purchasing, compressing, transporting, storing, exchanging, and selling gas to two other companies, granted a return of 6.9 per cent in view of attrition factors. *Re Pacific Lighting Gas Supply Co. Decision No. 54465, Application No. 37553*, January 29, 1957.

Electric Company Financing. Potomac Electric Power Company, requiring substantial new financing for construction, redemption of preferred stock, and payment of short-term bank loans, was authorized by the District of Columbia commission to issue 5½ per cent debentures and 5½ per cent preferred stock, with total proceeds of about \$45 million and a resulting capitalization of 58.6 per cent debt, 35.5 per cent common stock equity, and 5.9 per cent preferred stock. *Re Potomac Electric Power Co. Order No. 4352, PUC No. 3583, Formal Case No. 451*, January 30, 1957.

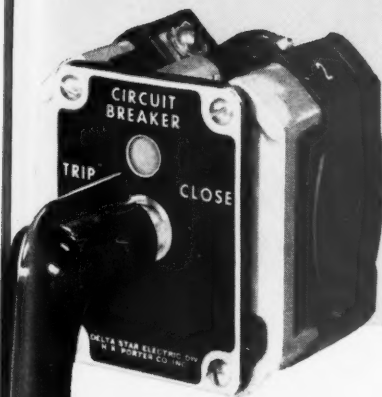
Stock Split for Unified Control. The Indiana commission, on a finding of public interest, authorized a closely held water company, whose common stock all carried voting rights, to effect a stock split so as to create a nonvoting class of common in order that continued unified control of the company may be assured in the event that some of the stock must later be sold to meet death taxes. *Hoosier Water Co., Inc. No. 26997*, January 4, 1957.

Extension Deposit. The Connecticut supreme court of errors held that a water company's requirement that a deposit be posted in order to secure the extension of service was neither unreasonable nor illegal. *New Haven Water Co. v. Mauro Construction Co.* 128 A2d 531.



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Copies of the Prospectus may be obtained from any of the several underwriters only in States in which such underwriters are qualified to act as dealers in securities and in which the Prospectus may legally be distributed.

The First Boston Corporation

Ladenburg, Thalmann & Co.

Carl M. Loeb, Rhoades & Co.

Wertheim & Co.

Allen & Company

Hayden, Stone & Co.

Arnhold and S. Bleichroeder, Inc.

Baker, Weeks & Co.

E. F. Hutton & Company

Baumgartner, Downing & Co.

NEW ISSUE

March 20, 1957

577,883 Shares

Baltimore Gas and Electric Company Common Stock

(No Par Value)

Holders of the Company's outstanding Common Stock are being offered rights to subscribe at \$31 per share for the above shares at the rate of one share for each eleven shares of Common Stock held of record on March 18, 1957. Subscription Warrants will expire at 5:00 P.M., Eastern Standard Time, on April 3, 1957.

The several Underwriters have agreed, subject to certain conditions, to purchase any unsubscribed shares and, both during and following the subscription period, may offer shares of Common Stock as set forth in the Prospectus.

Copies of the Prospectus may be obtained from any of the several underwriters, including the undersigned, only in States in which such underwriters are qualified to act as dealers in securities and in which the Prospectus may legally be distributed.

The First Boston Corporation

Blyth & Co., Inc.

Alex. Brown & Sons

Harriman Ripley & Co.

Incorporated

John C. Legg & Company

Merrill Lynch, Pierce, Fenner & Beane

White, Weld & Co.

This advertisement is neither an offer to sell nor a solicitation of offers to buy any of these securities. The offering is made only by the Prospectus.

NEW ISSUE

March 20, 1957

74,175 Shares

Colorado Central Power Company Common Stock

(\$5 Par Value)

Holders of the Company's outstanding Common Stock are being offered rights to subscribe at \$22.50 per share for the above shares at the rate of one share for each 3¼ shares of Common Stock held of record on March 4, 1957. Subscription Warrants will expire at 3:00 P.M., Mountain Standard Time, on April 2, 1957.

The several Underwriters have agreed, subject to certain conditions, to purchase any unsubscribed shares and, both during and following the subscription period, may offer shares of Common Stock as set forth in the Prospectus.

Copies of the Prospectus may be obtained from any of the several underwriters only in States in which such underwriters are qualified to act as dealers in securities and in which the Prospectus may legally be distributed.

The First Boston Corporation

Dean Witter & Co.

Boettcher and Company

Bosworth, Sullivan & Company, Inc.

Woodcock, Hess, Moyer & Co. Inc.

This advertisement is neither an offer to sell nor a solicitation of offers to buy any of these securities. The offering is made only by the Prospectus.

NEW ISSUE

March 20, 1957

163,334 Shares

Savannah Electric and Power Company Common Stock

(\$5 Par Value)

Holders of the Company's outstanding Common Stock are being offered rights to subscribe at \$18 per share for the above shares at the rate of one share for each six shares of Common Stock held of record on March 18, 1957. Subscription Warrants will expire at 3:30 P.M., Eastern Standard Time, on April 1, 1957.

The several Underwriters have agreed, subject to certain conditions, to purchase any unsubscribed shares and, both during and following the subscription period, may offer shares of Common Stock as set forth in the Prospectus.

Copies of the Prospectus may be obtained from any of the several underwriters only in States in which such underwriters are qualified to act as dealers in securities and in which the Prospectus may legally be distributed.

The First Boston Corporation

Stone & Webster Securities Corporation

Johnson, Lane, Space and Co.

Kidder, Peabody & Co.

White, Weld & Co.

Incorporated

A. C. Allyn and Company

Courts & Co.

Francis I. duPont & Co.

Incorporated

Equitable Securities Corporation

The Robinson-Humphrey Company, Inc.

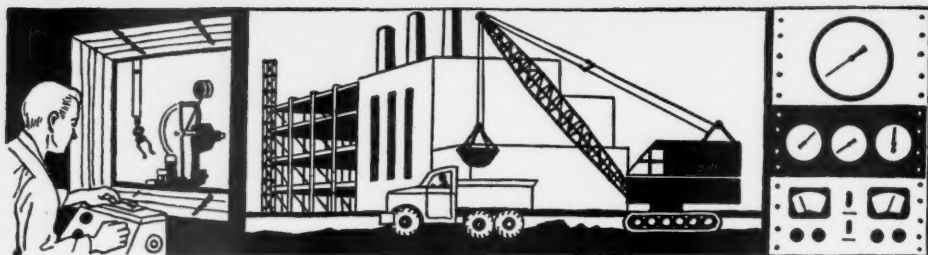
Clement A. Evans & Company, Inc.

Folger, Nolan, Fleming-W. B. Hibbs & Co., Inc.

Schmidt, Poole, Roberts & Parke

Varnedoe, Chisholm & Co.

Incorporated



Industrial Progress

CP&L Expanding As Usage Grows

DIRECTORS of Carolina Power & Light Company voted recently to spend \$24,000,000 in 1957 to supply steadily growing electric demands. Expansion items include a new 235,000-horsepower generating unit, plus new and improved transmission and distribution facilities.

Louis V. Sutton, CP&L president and board chairman, cited company growth in reviewing 1956 operations and in outlining 1957 plans. He said gross revenues totaled \$63,000,000 last year, a gain of eight per cent over 1955. Mr. Sutton said residential users averaged 4,279 kilowatt hours, or 45 per cent above the national average of 2,980 kilowatt hours.

National Cash Register Announces New Computer for General Business Use

A PROGRAM to produce a new type of electronic data processing system for general business use was announced recently by The National Cash Register Company.

Designated as the NCR 304, the new system will provide automatic accounting, auditing, reporting and other business record-keeping functions in one continuous high-speed operation. It is designed to reduce substantially the cost of keeping business records and to provide important operating advantages. In addition, it will supply management and supervisory personnel with more complete and timely information with which to make business decisions.

NCR officials announced that the General Electric Company has been awarded a contract to develop and produce many key elements of this system. NCR will construct the system's electro-mechanical parts and

will market and service the new system through its 500 sales and service outlets across the United States. The Computer Department of General Electric, located in Phoenix, Arizona, will be responsible for the production-engineering and production of the electronic computing elements of the equipment.

Consisting of a central electronic computer, magnetic-tape memory units, media converters and various high-speed input and output equipment, the NCR 304 is transistorized throughout. Transistors afford important advantages over vacuum tubes through small size, low power requirements, sharp reduction in cooling problems and greater reliability of performance. The computer employs a magnetic core memory and unique circuit designs to provide unusual flexibility in meeting business needs.

A prototype of the NCR 304 system is currently under construction and will be completed this year. The first production model is scheduled for delivery in approximately two years.

Montana-Dakota Utilities to Spend \$12,000,000 on Construction in 1957

MONTANA-DAKOTA Utilities Company has a construction budget for 1957 totaling \$12,000,000. This sum includes expenditures during the year of \$6,100,000 on the new generating plant at Sidney, Montana.

The company expended \$8,364,447 for additions to its utility system during 1956, including work in progress at year end. Of this sum, \$4,726,265 went for improvements to gas transmission and distribution facilities and \$3,244,172 for additions to the electric system. Major electric construc-

tion projects included 55 miles of 6 kilovolt transmission line from Belah to Dickinson, N. D., and 43 miles of 57 kv transmission line from Williston to Tioga, N. D.

New York Telephone Gained 370,000 Telephones in 1956

THE New York Telephone Company in 1956 gained nearly 370,000 telephones to pass 7 million telephones in service, Keith S. McHugh, president, said in the company's annual report released recently.

During 1956, Mr. McHugh reported, construction outstripped previous marks with expenditures totaling \$280 million—\$60 million more than in 1955. Plans for the next five years call for around \$300 million in construction, or about \$1.2 million per working day, to meet anticipated demands for service.

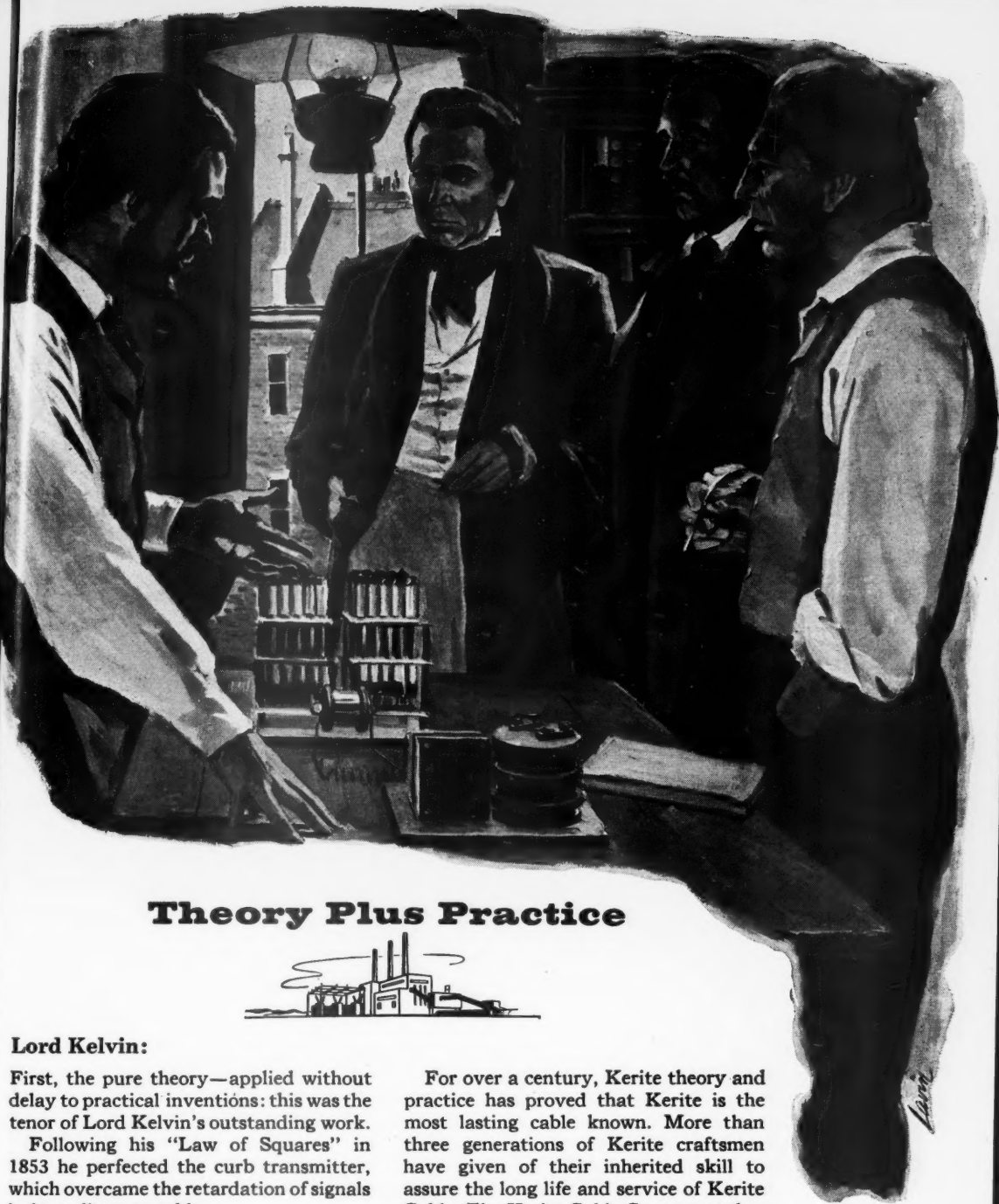
Jersey Central Power & Lt. Has \$24,199,500 Program

EXPENDITURES of \$24,199,500 are planned by the Jersey Central Power & Light Company for expansion projects throughout its service territory in 1957.

Charles E. Kohlhepp, president of JCP&L and New Jersey Power & Light Company, in announcing the record budget stated that in the past 10-year period the company has expended \$107 million for expansion and is expecting to spend for the same purpose approximately \$25 million each year for the next three years.

The budget for 1957 shows \$8,222,000 earmarked for new power generation. A new power addition now under construction at the electric company's Sayreville station is expected to be completed in 1958 at a

(Continued on page 24)



Theory Plus Practice



Lord Kelvin:

First, the pure theory—applied without delay to practical inventions: this was the tenor of Lord Kelvin's outstanding work.

Following his "Law of Squares" in 1853 he perfected the curb transmitter, which overcame the retardation of signals in long-distance cables.

From Lord Kelvin's theory plus practice, more than a century ago, stem today's advances in communications.

For over a century, Kerite theory and practice has proved that Kerite is the most lasting cable known. More than three generations of Kerite craftsmen have given of their inherited skill to assure the long life and service of Kerite Cable. The Kerite Cable Company takes pride in the fact that their product is chosen by buyers of integrity to safeguard installations around the world.

The value and service life of a product can be no greater than the integrity and craftsmanship of its maker.

KERITE CABLE

THE KERITE COMPANY—30 Church St., New York 7, N. Y.

Offices also at 122 S. Michigan Ave., Chicago; 582 Market St., San Francisco;

3901 San Fernando Rd., Glendale 4, Calif.; 31 St. James Ave., Boston;

4101 San Jacinto, Houston 4, Texas; 1010 Euclid Avenue, Cleveland 17, Ohio;

29 West Lancaster Avenue, Ardmore, Pa.



Founded 1854

total cost of approximately \$25 million.

This power addition will be the fourth completed by JCP&L in the last decade and will raise the utility's system generating capacity to 514,000 kilowatts, or nearly four times its 1945 capacity.

More than \$3,500,000 of the total amount to be spent for new construction in 1957 will be for new transmission facilities "to stay ahead of the increasing electric needs of the area it serves."

Mr. Kohlhepp said that the company is engaged in the erection of new substations throughout its territory. For 1957, over \$4,000,000 is scheduled for these projects.

New and expanded distribution facilities will require \$6,834,500.

For miscellaneous expenditures including right-of-way acquisitions, street light installations and other related projects, the company has included \$1,319,050.

Some of the projects provided for in the 1957 budget have already been started and several will require two or more years to complete.

New Cable Puller to Salvage Underground Cables

NEW cable pulling rigging is announced by T. J. Cope, Inc. of Collegeville, Pennsylvania, for salvaging underground cables.

The heavy duty puller that will handle 2½ in. and 3 in. cables applies a strong, positive grip that can readily be released by slackening the winch line. In this fashion the cable is readily withdrawn from the conduit.

Cope makes a complete line of equipment for installing underground cable. The company is also known for its system of expanded metal trough widely used by utilities and industry as an open type system for supporting and protecting cables.

Motorola Announces New "Quik-Call" Selective Signaling Package

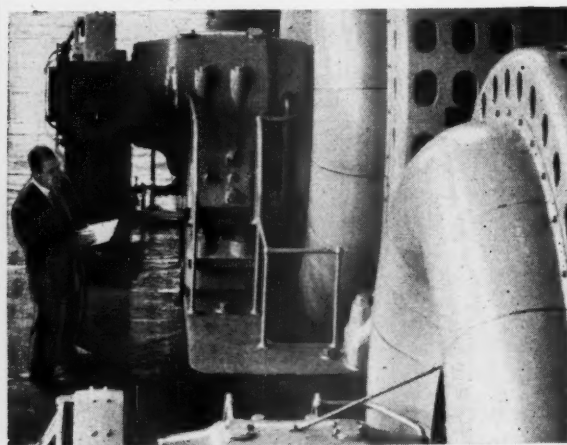
A SINGLE-UNIT console providing complete selective calling facilities for land-mobile two-way radio base station installations has been announced by Motorola, Inc., Communications & Industrial Electronics

Division.

Recently added to the Motorola "Quik-Call" selective signaling line the new console combines all the signaling elements, including tone generator, timer, power supply and code selector, in a single compact package. Greatly simplified with respect to installation, adjustment and operation, the console can be quickly and easily added to any existing two-way radio system, regardless of make or model. Overall dimensions are approximately 13 in. x 10 in. x 7 in. weight is 24 lbs. complete.

With the addition of selective calling facilities, a mobile receiver in two-way radio system responds only to calls specifically directed to it, and is silenced to all other traffic on the channel. "Quik-Call" signaling can also be used to remotely operate bell lights, sirens or other devices. Units equipped with decoder elements are individually selected by transmitting a code consisting of two dual audio tones. Simultaneous selection of several units is achieved with a single two-tone code.

(Continued on page 26)



American Appraisals meet the requirements of Trust Indentures

An American Appraisal provides all needed facts when the trustee must furnish an authoritative certificate of value, or verify the existence and condition of all assets.

The AMERICAN APPRAISAL Company

Leader in Property Valuation
Home Office: Milwaukee 1, Wisconsin

More for your Money in

MORYSVILLE



New Line Construction Body for single or dual wheel chassis from ½ to 2 tons. Length from 8' to 14' (CA's from 48" to 120"). Sliding roof for derrick; ample stowage space inside and out. Many plus features at no extra cost.

- 14 and 16 ga. Body Steel (14 ga. throughout for models rated 1 ton up—19 ga. doors).
- ½" Diamond Floor Plate.
- 5" Structural Channel Under-structure.
- Electric Welded throughout.
- Telescoping Roof with weather tight, easy sliding action.
- One piece Smooth Welded Draw-ers and Compartments.
- Vertical or Horizontal Flush Doors with recessed, spring loaded latches at no extra charge.
- Concealed metal Winch Box.
- Curbside Access to tools and equipment used most frequently.
- Vertical Compartments for climbers, lines and linemen's tools.
- Large, inside ventilated, Rubber Goods Compartment.
- Two piece Front Window in crew compartment.
- Bit and Chisel Drawer; Trough for Drills, Tamps, Rods, etc.
- Fendix Undercoating at no extra charge.

IMMEDIATE DELIVERY • Distributors in Principal Cities

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**HALL
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Stones and rocks made digging tough.

Compact rugged Cleveland's smooth crawler mounting real public relations asset in 70,000' tough digging

The light weight, hi-tensile alloy steel construction and smooth crawler mounting of this Cleveland 92 "Baby Digger" enabled Rich & Co., Bradford, Pa. to cut 70,000 feet of trench in stony tough digging without causing damage to the sidewalks and fine old lawns in and around Groton, N. Y. The compact design and quick-and-easy maneuverability of the 92 were other big helps in digging these 4-inch pipe gas mains and laterals for New York State Electric and Gas Co., Ithaca, N. Y. The rugged 92 weighs only 10,000 pounds, is only 4½ feet wide over its crawlers, yet digs 10 to 20 inch trench widths and down to full 5 feet deep—in *all* soils.

The 10,000 lb. 92 treads lightly on lawn and sidewalks.



Compact 92 can put trench within 20" of side obstructions.



THE CLEVELAND TRENCHER COMPANY

Everywhere

20100 St. Clair Avenue

Cleveland 17, Ohio

INDUSTRIAL PROGRESS—(Continued)

An auxiliary selector box has also been added to the line which provides one-touch transmission of the four-tone code. Connected in parallel with the console, each additional selector box permits a maximum of 32 codes to be pre-selected and each transmitted with a single push-button operation. The advantages of this latter feature are of special interest to two-way radio-equipped fleet dispatchers and others having continuing selection needs. Additional selector boxes (up to ten) can provide as many as 320 pre-selected codes.

\$59,000,000 Program Planned by Northern Indiana Public Service

NORTHERN Indiana Public Service Company will spend \$59,000,000 in 1957 and 58 for expansion and modernization of facilities, Dean H. Mitchell, NIPSCO president, revealed recently in the company's annual report to stockholders.

Mr. Mitchell said the huge multi-million dollar construction program—based on careful planning and long range forecasts—is designed to keep ahead of the increasing demand for

gas and electric service throughout northern Indiana and is tangible evidence of the company's confidence in the continuing growth and prosperity of the territory it serves.

The largest single project NIPSCO's construction program is the tripling of the capacity of the new Dean H. Mitchell generating station on the lake front in Gary. Two 130,000 kilowatt generating units will be added, similar to the one that went on the line December 6, 1956. By 1959 the station's net generating capacity will be 390,000 kilowatts.

Other projects include a new 138,000 volt substation at the Mitchell plant, new transmission lines and distribution substations in the Warsaw and North Judson areas, increase transformer capacity at Plymouth, East Winamac and Monticello, an extension of the company's microwave network to the Mitchell station and to the Maple substation in LaPorte, additional Propane storage and mixing equipment at East Chicago, South Bend and Fort Wayne and a new 12-inch gas main in the Elkhart district.

The company's new five-floor general office building annex in Hammond and local operating headquarters at Goshen and Logansport will also be completed early this year.

G-E to Supply Switchgear for PG&E's Underground Plant

GENERAL Electric's High Voltage Switchgear Department will supply buswork and switchgear for the first major underground power plant in the United States—Pacific Gas & Electric Company's 150,000-kilovolt ampere Haas power plant on the Kings river in central California.

The Haas Powerhouse will be located in rock chamber 500 feet vertically below the surface, and 2,000 feet into the mountain from the river. It will require a vertical run of bus—an aluminum bar which carries an extremely high current of electricity—running through 462 feet of rock from generators underground to transformers at the surface.

Forced-air cooling will be provided with the vertical bus duct, eliminating the installation of heat barriers every 50 feet, and solving the problem of temperature gradient on the long rise.

Forced-air cooling will also reduce the size of the bus duct, an important (Continued on page 28)

This advertisement is neither an offer to sell nor a solicitation of offers to buy any of these securities. The offering is made only by the Prospectus.

NEW ISSUE

March 6, 1957

154,834 Shares

Lone Star Gas Company

4.84% Convertible Preferred Stock
(Cumulative—\$100 Par Value)

Holders of the Company's outstanding Common Stock are being offered the right to subscribe at \$100 per share for the above shares at the rate of one share of Preferred Stock for each forty shares of Common Stock held of record on March 5, 1957. Subscription Warrants will expire at 3:30 P.M., Eastern Standard Time, on March 25, 1957.

The several Underwriters have agreed, subject to certain conditions, to purchase any unsubscribed shares and, both during and following the subscription period, may offer shares of Preferred Stock as set forth in the Prospectus.

Copies of the Prospectus may be obtained from any of the several underwriters only in States in which such underwriters are qualified to act as dealers in securities and in which the Prospectus may legally be distributed.

The First Boston Corporation

Kuhn, Loeb & Co.		Smith, Barney & Co.
Blyth & Co., Inc.	Goldman, Sachs & Co.	Harriman Ripley & Co. Incorporated
Kidder, Peabody & Co.		Lehman Brothers
Merrill Lynch, Pierce, Fenner & Beane		White, Weld & Co.
Dominick & Dominick	Drexel & Co.	W. C. Langley & Co.
Tucker, Anthony & R. L. Day	Dean Witter & Co.	Shields & Company
Rauscher, Pierce & Co., Inc.	Schneider, Bernet & Hickman, Inc.	First Southwest Company
McKelvy & Company	Moore, Leonard & Lynch	Chaplin and Company
Singer, Deane & Scribner	R. A. Underwood & Co., Inc.	Rotan, Mosle & Co.
		Henry, Seay & Black

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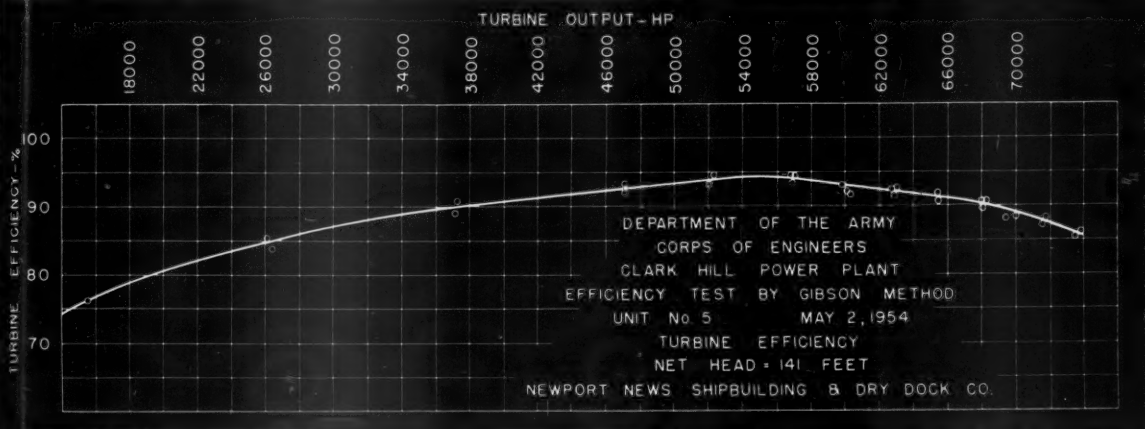
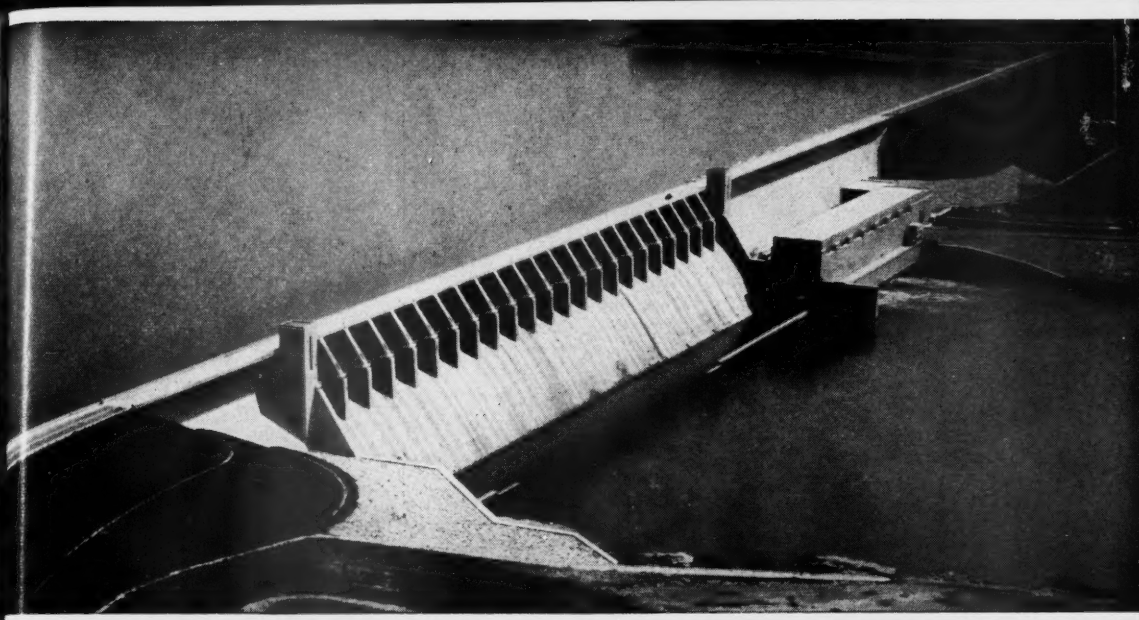
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28, 1957



Maximum efficiency of 94.1%

Reflects advanced practices at Newport News

THE GRAPH shows performance of a 55,000 horse-power turbine, one of seven such units built by Newport News for the Clark Hill Power Plant (see photo).

Shape of the curve is typical . . . not exceptional . . . for Newport News turbine performance. Regular, uniform, showing no-cut-off at full load, it indicates consistent delivery and stable operation.

And especially, experience in design and model testing.

At Newport News, turbine runners are continually being designed and redesigned for improvements in

performance. And often upon receiving a contract for turbines, a model setting is built and complete tests made. So far, Newport News has filled turbine contracts with an aggregate rated output in excess of 7,000,000 horsepower.

Penstocks, spiral casings, valves, pumps, rack rakes and other essentials are also designed and built by Newport News. Our illustrated booklet, "WATER POWER EQUIPMENT," will be sent to you upon request.

Newport News

Shipbuilding and Dry Dock Company
Newport News, Virginia

Engineers . . . Desirable positions available at Newport News for Designers and Engineers in many categories. Address inquiries to Employment Manager.

INDUSTRIAL PROGRESS—(Continued)

factor since space in the vertical shaft will be at a premium.

In some cases in Europe protection from bombing, avalanches, or snowslides has been the reason for location of underground power plants. In the case of the Haas plant, however, the location involves economics. It will reduce the penstock cost and produce more power than a surface unit under the conditions existing at the site. Transformers will be located at the top of the gorge because it would be impractical to place them underground, and unsafe to run transmission lines up through a shaft.

Aluminum, isolated-phase bus duct and switchgear will also be furnished by G.E. for three other new PG&E power stations. All four stations are scheduled for completion in 1958.

The other three are the 108,000-kva Balch powerhouse, also on the Kings river, and the 122,000-kva Caribou No. 2 and the 40,000-kva Butt Valley powerhouses on the Feather river in northern California.

Pennsylvania Pwr. & Lt. Has \$193,000,000 Five-year Program

CHAS. E. OAKES, Pennsylvania Power & Light Company president, recently announced that the utility will spend nearly \$24,000,000 this year for the construction of new and the expansion of existing electric facilities. For the five-year period, 1957-1961, according to Mr. Oakes, construction expenditures will reach an estimated \$193,000,000.

At the same time, Mr. Oakes made public the company's plans for a power plant of 330,000 kilowatts of capability to be ready in late 1960. The new coal-fired unit, which will be twice as large as the largest present unit on the PP&L system, will be located on Brunners island, 15 miles below Harrisburg on the west bank of the Susquehanna river. The 766-acre site for this new power unit was purchased early last year and has a future potential of installation there of 2 million kilowatts of capacity.

In reviewing the larger construction projects scheduled for the current year, Mr. Oakes pointed out the extension of a 220,000-volt transmission line to the South Akron substation and construction there of a 150,000-kva substation addition. Another is the start of work on the steel tube replacement of the remaining half of the 3½-mile-long, 14-foot wood stave flow line from the company's Lake

Wallenpaupack to its hydroelectric plant scheduled for completion in 1958.

Anticipated expenditures for 1957 will be almost entirely for transmission, distribution and general facilities with the budget items for generating including only completion of work at Martins creek and engineering for the new unit.

Actual construction on the new plant will not begin until 1958. It will be of the semi-outdoor type and will, in that respect, be similar in design to the Martins creek station. The new unit will be of the latest high pressure type operating at 2400 pounds per square inch, which is nearly double the pressure of the largest units now in service for PP&L. It will require more than one-half million tons of coal per year. The project also calls for a large switching station immediately adjacent to the plant which will serve as the tie-in point to the company's 220,000-volt main transmission network.

The \$193,000,000 expenditure for the five years ahead represents, said Mr. Oakes, a substantial stake in the future of the service area in which the company has already spent some \$373,000,000 over the postwar period. These projected construction expenditures are based on completion of the new plant at Brunners island in 1960 and continuation of research and development in connection with the company's atomic plant project as well as substantial expansion of the transmission and distribution systems.

West Penn Power Has \$35,000,000 Program

A record one-year construction and expansion program of over thirty-five million dollars is planned this year for West Penn Power Company.

Record increases in residential and commercial consumption in 1956, and the substantially increasing industrial, street lighting, and farm usage are reasons for planning the highest single-year expenditure for facilities in the company's history.

The year's program provides for work on additional generating facilities, increased capacity for lines and substations in some areas and new facilities in others, and other service improvements that affect just about every point in the company's service area in western and north central Pennsylvania.

The projected 1957 expenditure comes on top of \$171 million spent

the past 10 years on expansion in West Penn.

Additions to generating capacity are under construction at the new Armstrong power station, north Kittanning. One 165,000 kw unit scheduled to go "on the line" in 1958. A second about the same size will follow.

R. M. Casper Named General Manager New A-C Nuclear Power Division

FORMATION of a Nuclear Power Division to continue, on a broad basis, the development of skills and equipment for the wider use of atomic energy was announced recently by Allis-Chalmers Manufacturing Company. Previously, the company's activities in this field were conducted by its Nuclear Power Department.

R. M. Casper has been named general manager of the new operating division which, along with the General Products, Industrial Equipment and Power Equipment Divisions, is under J. L. Singleton, vice president, Industries Group.

"Formation of the division recognizes the position of Allis-Chalmers in the atomic energy field and the extensive role to be played by the company in this field in the future," Mr. Casper said. "The nuclear power activities cut across Allis-Chalmers' established product lines and the new division will make use of the extensive know-how and talents presently available in the company."

"It will make the most effective use of Allis-Chalmers' research development and facilities in fields that are important in the nuclear power picture, such as metallurgy, chemistry, heat transfer, materials testing, instrumentation, and high energy radiation."

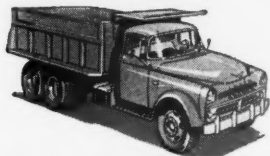
The present nuclear power department has been made a part of the new division.

Allis-Chalmers recently announced an advanced type of nuclear reactor—a controlled recirculation boiling reactor. A group of midwest utilities have announced they are planning a 60,000 kilowatt atomic power plant and are negotiating with Allis-Chalmers to be the prime contractor on the project.

Allis-Chalmers built all the power generating equipment for the atomic power plant now producing 5,000 kilowatts of electricity at Argonne National Laboratory.

(Continued on page 30)

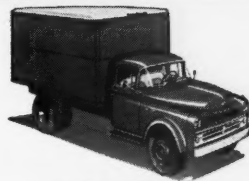
DODGE *PowerGiants*



**Dodge T700
Tandem**



**Dodge P300
Forward-Control**



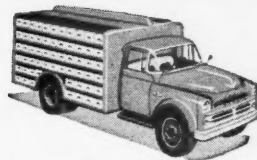
**Dodge 600
with Van Body**



**Special bodies fit readily
on any Dodge chassis**

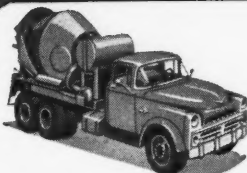


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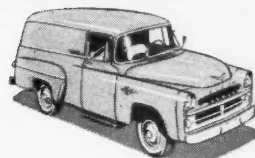


**Dodge 400
with Beverage Body**

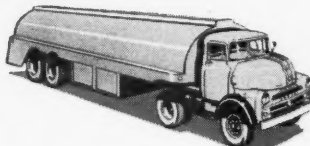
MOST POWER OF THE LOW-PRICED 3



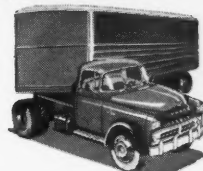
**Dodge T900
Tandem**



**Dodge 100
Panel**



**Dodge C.O.E. 700
Tractor**



**Dodge 800
Tractor**

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tional Laboratory, Lemont, Ill. The company will build a specially designed 150,000-kilowatt steam turbine-generator unit for the Enrico Fermi Atomic Power Plant near Detroit, Mich. Allis-Chalmers is a member of the two groups which are designing and building the Fermi plant.

Utah Power & Light Plans \$46,000,000 Program

AN expenditure of \$46,000,000 is scheduled by Utah Power & Light Company in the three-year period 1957-59, according to E. M. Naughton, president. Largest yearly expenditure will be \$21,800,000 in 1957, followed by about \$12,000,000 over the next two years.

Stanford Research Speeds X-Ray Analysis of Atoms

SURPRISING though it may be to some, utility and natural gas transmission companies employ metallurgists and other technically skilled individuals, either on regular contract or a consulting basis. These scientists are working on one of the most dramatic frontiers of the modern world. Nothing has dramatized their province more than General Electric Company's creation of synthetic industrial diamonds a few years ago. Recently outdoing themselves, came GE's development of "Borazon" a crystalline boron nitride which has the same strength but greater heat resistance than the long-unsurpassed diamond.

Now, metallurgists know that iron, crystallized in the total absence of atoms from other elements, has many times the strength of steel. This is one of the "stranger than fiction" facts arising from closer study of the lattice-like atomic structure of crystals, metal and non-metallic. How to speed up the study process is, of course, most useful knowledge. This is described in the following excerpt from the March issue of "Research for Industry," a news bulletin of Stanford Research Institute, Menlo Park, Cal.

"The time required for the x-ray analysis of crystalline structures can be reduced from months to hours through a new computer developed at Stanford Research Institute for use in the Institute laboratories. Conceived by Dr. Dan McLachlan, Jr., in connection with Institute-sponsored basic research, the computer is only a fraction as complex, bulky, or costly

to make compared with others currently employed for similar purpose.

"The fundamental problem in crystal structure analysis is to determine the positions of the atoms in the crystal in relation to one another. The first step in obtaining this information is to direct an x-ray beam on a sample of the crystalline material being analyzed. The x-rays, scattered by the electrons of the atoms of the material, strike a photographic film. As the atoms in crystals are orderly in their arrangement, the resulting exposure, or 'spectrograph,' shows an array of spots which are orderly in both position and intensity.

"These spot positions and intensities do not directly lead to a true pattern of the actual placement and concentration of the atoms in the crystal. Such a final pattern has hitherto been obtainable only by human computation, requiring a large investment of time, or by large electronic digital computers expensive to purchase or not readily available for such purpose.

"Through use of the new computer, however, an exact pattern can be obtained much more rapidly and at much less expense. Coordinate numbers representing the relative spot locations and the intensity of each spot, obtained from the original x-ray spectrograph, are fed into the computer. These two numbers govern the relative rotation of two transparent film discs marked with parallel lines. By means of a controllable lamp, an exposure is made through the two discs onto an unexposed photographic film for a time proportional to the measured intensity of the given spot.

"Adjustment of the two discs and the exposure time thus provides for combining the three variables—two spot position measurements and one intensity measurement. When an exposure is thus made for each and every spot on the spectrograph film, the resulting picture reveals the correct structural pattern of the specimen crystal."

Heavy Water Reactors For Low Cost Power?

RECENT studies of designs for large atomic power stations suggested the possibility that the heavy water moderated reactor might within ten years show a cost advantage over the gas-cooled, graphite moderated reactor and maintain this lead for many years, Dr. W. B. Lewis, vice-president, Research and Development,

Atomic Energy of Canada Limited, told a meeting in Philadelphia, Pa., mid-March.

Speaking to the Fifth Conference on Atomic Energy in Industry sponsored by the National Industrial Conference Board, Dr. Lewis pointed out that in Canada, where relatively large amounts of inexpensive hydroelectric power were available, nuclear power stations would provide for a large fraction of the rapidly growing demand for electrical power only at the cost of nuclear power could be brought to less than six mills per kilowatt hour. Whereas Chalk River scientists and engineers had not been able to see six years ago how this target could be met, it now seemed "just possible."

"Our experience was unique at least in the Western world," Dr. Lewis reminded his audience in recounting the advances made at Chalk River towards obtaining a large amount of energy from uranium: "no one else has been operating a high power, natural uranium, heavy water moderated reactor." Chalk River had not kept the information to itself, but to others it was second-hand information and so they could be excused for having missed the great significance of the advances. "To this day," he added, "many fail to understand why this energy yield at low cost appears so easy to obtain from a heavy water reactor but so difficult from others."

Great advances towards the Canadian target had been made in the reduction of the cost of fuelling reactors. Experiments had shown that uranium oxide, rather than the natural uranium metal which had been used in the Chalk River reactors, would be the best fuel. "Today we would not propose to use uranium metal with heavy water coolant," he said. Uranium oxide was more resistant to corrosion than the metal, thus making possible more satisfactory fuel elements.

Dr. Lewis described a new method of fuelling reactors to obtain the maximum amount of energy. The proposed type of power reactor would have channels running horizontally through the tank of heavy water. Short pieces of fuel would be inserted from opposite ends of adjacent channels. When a new piece of fuel was inserted at one end of a channel, a spent piece of fuel would be pushed out the opposite end. By this means each fuel slug would attain the same high "burn up."

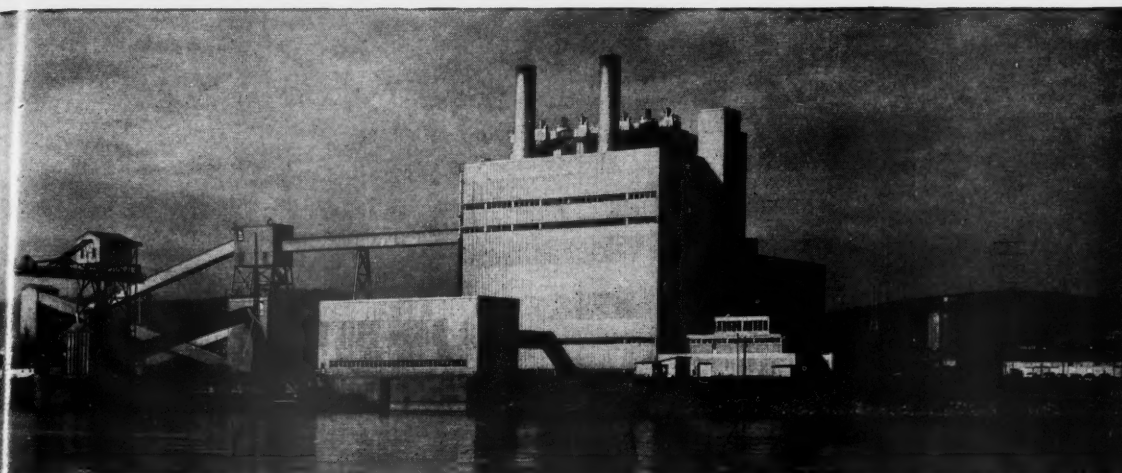
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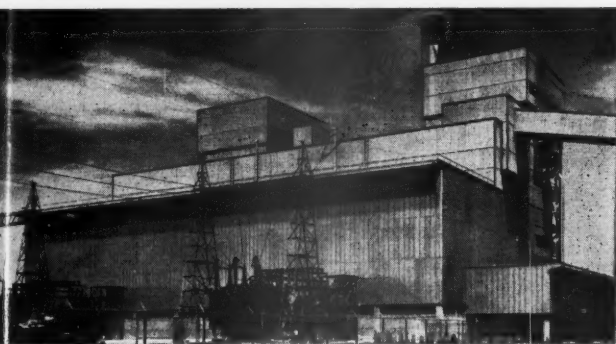
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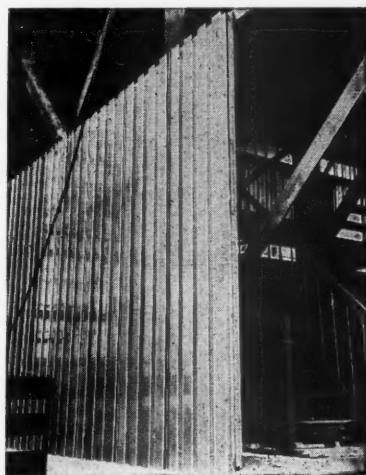
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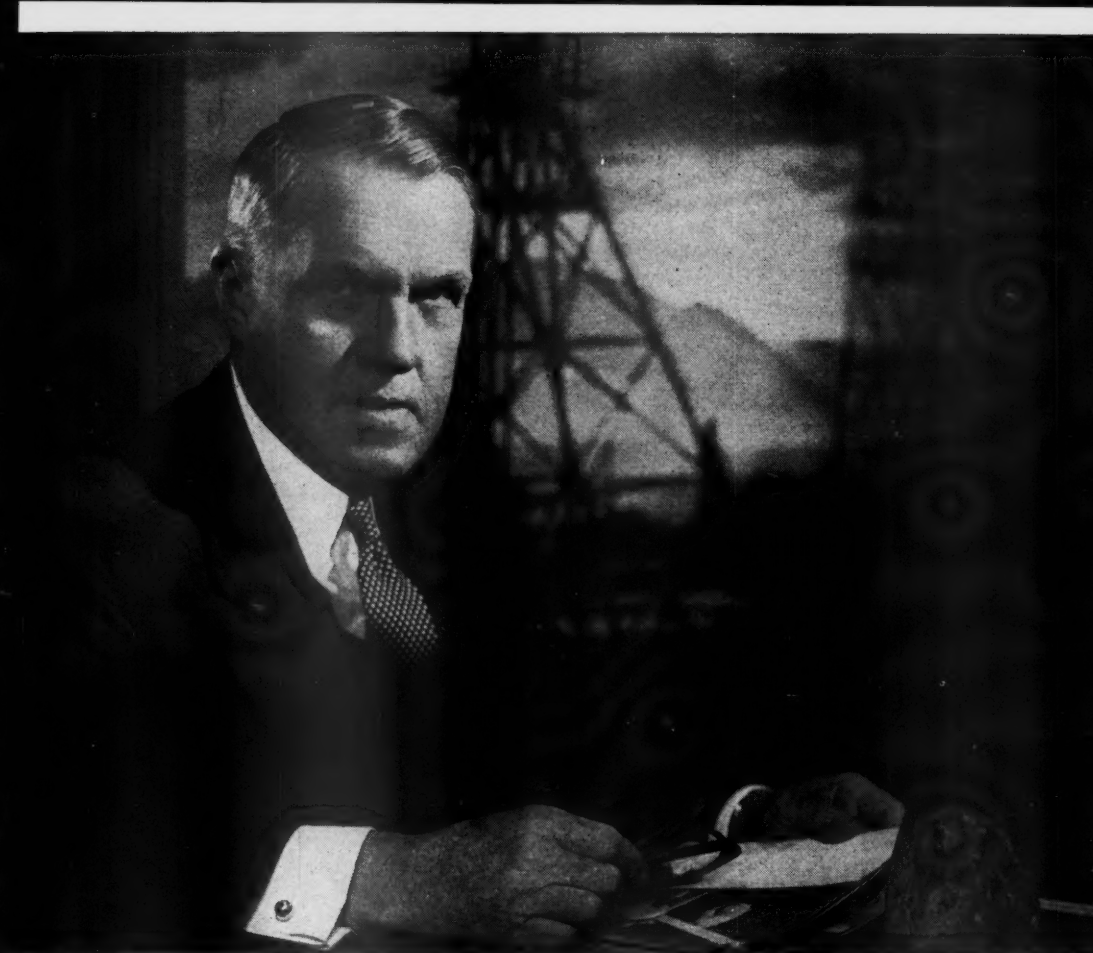
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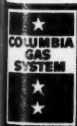
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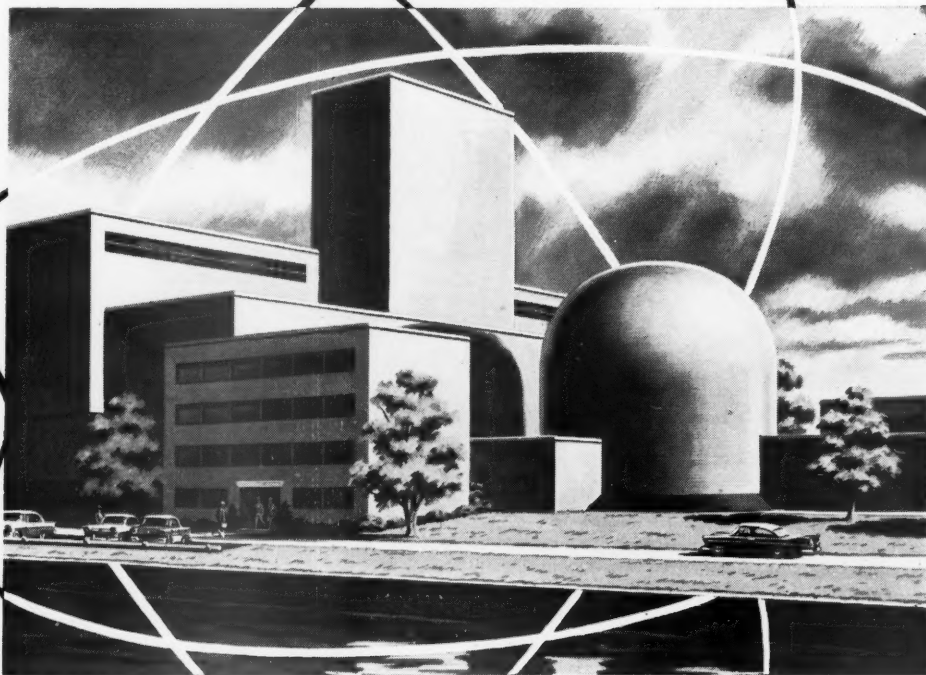
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Industry has applied Forum ideas on such subjects as materials handling and automation in planning plant expansions. Utilities have seen "grass roots" contact with industrial customers at the Forums help spur new load. General Electric, through suggestions from Forum guests, has gained a greater awareness of industry's electrical needs and has continually improved the program so it is now a pool of the latest thinking for increasing productivity. All three—industry, electric utilities, and General Electric—have found the valuable interchange of ideas afforded by the Forums has greatly furthered mutual understanding of electric power and equipment problems.

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